

**How Green was Our Valley:  
The On-Going; Ruthless Violation of The South Eastern Water Towers of Pakistan.  
Galliyat, Abbottabad District, Hazara Region: Pakistan.**



**“In Wildness is the Preservation of the World.” Henry David Thoreau 1862**

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## **Introduction:**

The Entire World is Facing the threat of Global Extinction, never before witnessed by humanity. Scientists predict that more than 1 million species are fast-tracked for extinction within the next few decades. Now Climatologists are Warning us that Humanity is faced with the most serious existential threat, due to the laissez-faire attitudes of Dialectic Materialism and Pseudo Intellectual Existentialists.

The Extinction of even a Single Species impacts the Entire World by unraveling the very Fabric of The Web of Life. The Consequences are Global in scale, not just in the places of those species but for all Creation on this Planet. Immediate losses, such as crop pollination; pest control and water purification, are amplified by Spiritual and Cultural Loss.

We are so much focused on the immediate impact of Daily Life that we have no time to spare to take the future impact of our actions upon the World. If only we, each and every one of us, were to consider that his or her act just might be the action that tips the scale towards destruction.

We need to take Responsibility for own acts of Commission and Omission as well as hold Accountable those of others, especially, firstly, our immediate neighbors, and then the 'Power That Be'. Whether they belong to our Nation or any other Nation of the World.

Already the worst impacted Nations of Climate Change are suffering from the ill conceived and rank materialistic consumerism of the so-called Advanced Nations.

The Corona Pandemic is itself a Grim Reminder as to how the Action of a few can change the entire World.

We cannot, any longer, afford to be held hostage to the irresponsible acts of the few and Needs must uphold the Rights of All Creation.

"The current extinction crisis is entirely of our own making. More than a century of habitat destruction, pollution, the spread of invasive species, over-harvest from the wild, climate change, population growth and other human activities have pushed nature to the brink. Addressing the extinction crisis will require leadership"!

Forests and the foresters come to mind first when most people think of conservation. Just what is the role of the forest and the forester in this vital concept called conservation?

Monroe Bush, eminent American Forester, looks upon a forester as a conservationist standing at a gate between two worlds. On one side of the gate is human technology—factories, machines, concrete buildings, and paved highways. On the other side is the perfection of God's natural world.

If you ask a forester to give a definition of forestry, he is apt to say, "Forestry is the scientific management of forests and forest lands for the continuous production of goods and services.

The forester is the gatekeeper. More than any other man he determines the effect of one world upon the other. Whether the hunger of technology for raw materials will exhaust the earth, or the earth provide a sustained flow of resources for the well-being of mankind, is to a great extent the responsibility of the forester.

Trees and their forest communities are the foundation upon which the entire natural world of renewable resources is balanced. He who manages the forest, manages the key to an undiminished yield of the earth's living abundance.

Merely by existing, forests offer invaluable services. Probably the most important is the effect on our water supply. They protect the watersheds of streams and rivers, help keep the water pure, and serve to stabilize the supplies from both surface and underground sources. Forests and forest lands also furnish a place where people by the millions may enjoy outdoor recreation, where scientists may study nature in the wild, and where those who appreciate natural beauty may go for inspiration, relaxation and solitude. Indeed, it would be almost impossible to point out all the ways in which the presence of forests and the forest crops which they grow serve to make this a stronger, wealthier, and healthier country.<sup>1</sup>

“One tree would have to be planted every year to offset the CO<sub>2</sub> produced by a low energy light bulb, which at a first glance doesn’t appear to be a lot.

When you think about it in detail, it’s more than likely that each room within your house has at least one light bulb. For example, if your home has a total of eight light bulbs inside it, then eight trees would need to be planted each year. Times this by every house in the country and you can start to understand how serious the issue is.

According to experts, with the amount of trees that are removed from forests and similar areas each year, the world will be without any trees within the next 300 years. With this in mind, it’s essential that countries across the world do all they can to support reforestation. This process means that trees must be planted on a mass level, preventing the extinction of trees and wildlife that live in them.

Many animals across the globe are currently facing extinction due to deforestation and more needs to be done to prevent this.<sup>2</sup>

Existing Forests need to be carefully husbanded and treated with the care and veneration that they deserve. Under such trying circumstances, it is Criminal to ruthlessly exploit them in the name of Progress. Actually, it is the naked pursuit of Funds and Commissions that spurs on the use of the Fig Leaf of Tourism Enhancement for predatory materialism!

### **Forest Nutrition:**

Twigs and branches from Natural Pruning, and dead leaves, form the first level of most of the food chains of the forest. They also form the natural habitat of biota of the forest floor, which are of primary importance in the dynamics of forests. The mineralization of leaf and twig litter, aided by biota, is used by the trees and provides some of the energy pathways through the Eco System. When the forest litter is removed for burning, by the local and refugee population, great harm is done to the forests. Their food is snatched away and the habitat of biota is ruined. Symbiotic bacteria that help Pine trees in obtaining essential Nitrogen are killed and growth is stunted. Now a days even the bark of Walnut and Pine trees is being removed. This forms a protective layer to the Cambium layer. Between these two, the tree’s nutrition makes it’s way up the tree. Complete girdling (removal of bark all around, any place on the bole of the tree) results in death. The forest is a complex Eco System. Nutrition and balance between photosynthesis and respiration are the determining factors for a tree’s growth. This is greatest in the dense Pole Stage and slowest in mature trees. The thermal efficiency of

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1 Forestry and Park Management, Master Conservation Course, North American School of Conservation, Scranton, PA, USA.

2 <https://envirocivil.com/environment/viessmann-reveal-how-many-trees-would-need-to-be-planted-to-offset-the-uks-carbon-footprint/>

photosynthesis is 14 %. Up to 60 % of net radiation received is expended in transpiration. The actual process of photosynthesis accounts for only 1.5 %. Despite this the least productive Forest type is still more productive than many other Eco Systems, for example average cultivated land and the up swelling zones of oceans.

ENERGY

Breakdown of Organic Matter.

CONSUMPTION

Weathering Process in Soil.

IN THE

Hydrothermic Cycle.

FOREST FLOOR

Transport of substances in Soil Profile.

Quantative Investigation of Circulation Paths of

Essential Elements: Nitrogen (N), Potassium (P), Calcium (Ca).

Input From Rain.

Evolved a Circulation System

Subsoil Weathering.

which reduces Nutrient loss from leaching and runoff by keeping Most of the minerals locked up in Vegetation

Circulation within Forest-Soil-Animal System.

Losses by way of Crops of Plants or Animals.

Runoff in Dissolved & Particulate Forms.

**Nutrient Budget:**

Tropical Forest accumulation:

2,000 to 53,000 Kg per Hectare.

Dry Savanna accumulation:

1,000 Kg per Hectare.

The Long-Term Stability of a Forest Eco System depends upon the successful balance between the output and input of Nutrients. In case losses are high they need to be replaced.. The Cycling of Nutrients in a Forest involves:

- ( Uptake by Plants.
- ( Storage within the Organisms.
- ( Return to the soil via dead Organic Matter.

The quantities of nutrients at various stages is important to determine the quantities of minerals removed if a tree is harvested and taken elsewhere and if branch, twig and leaf litter is allowed to stay or cleared.

PROCESS	SPECIES		(Kgs)	Return	Storage	Thinning Removal
Uptake	Pine	N	45	35	10	1.8
		P	5	4	10.	1
		K	7	7	2	1
		Ca	29	19	10	5

Soil Fungi act as Nutrient Sinks. If the soil is bare the cupboard is bare. Minerals that originate in rock enter the soil and:

- Become Part of the Tree.
- Descend at Leaf Fall.
- Mineralized by soil fauna & flora.
- Available again for Uptake by the tree.

Thus it should be obvious that litter and fungi are especially important in the Forest They act as holding sinks for nutrients (P, Ca, Zn, Cu, Fe, Na). Increasing latitudes increase the turn over time of nutrients in various compartments. In areas where climate inhibits soil biota, un-mineralized Organic Matter is mineralized by fire.

#### **Stable Systems:**

A Stable Forest Eco System is one, which retains its minerals/ nutrients (conserves its essential elements) by circulating them within the soil-vegetation sub-system. Losses, to runoff, are balanced by inputs into the system. If man interferes with this process, it results in a rapid loss of minerals and particulate material. This results in eutrophication and siltation downstream. The rebuilding of Cycling in Northern Hardwood forests takes 60 to 80 years, in case there is no further interference. The introduction of shrubs and small trees within thinned and depleted Forests, or where afforestation is planned, has proved to be effective. This is due to the fact that annual uptake of nutrients is greater. The rapid growth of pioneer trees acts to curtail nutrient loss from the Eco System by:

- ( Breaking the impact of raindrops.
- ( Causing greater infiltration of water into the soil.
- ( Channeling of water from runoff to evapo-transpiration.
- ( Reducing losses by erosion and in the solution.
- ( Providing shade and reducing rates of decomposition of Organic matter.

Thus supply of soluble ions available for loss via runoff is curtailed.

<b>Ecosystem Type</b>	<b>Net Primary Production</b>			<b>Biomass</b>		
	Normal Range Dry Matter g/m <sup>2</sup> /year Total 10 t/yr <sup>9</sup>	Dry Matter Mean g/m <sup>2</sup>		Dry Matter Dry Matter Mean kg/m <sup>2</sup>	Dry Matter Normal Kg/m <sup>2</sup> Total 10 t/yr <sup>9</sup>	
Temperate Forest Evergreen	600-2,500	1,300	6.5	6-200	35	175
Woodland & Shrub	250-1,200	700	6	2- 20	6	50
Desert & Semi- Desert Scrub	10- 250	90	1.6	0.1- 4	0.7	13
Cultivated Land	100-4,000	650	9.1	0.4 – 12	1	14
Lake & Stream	100-1,500	400	0.8	0 - 0.1	0.02	0.05

Monitoring of the Nutrient Flow within the forest is essential, if sustained yield is to be maintained.

#### **Abbottabad District:**

Abbottabad's mountainous landscape is characterized by vertical vegetational variations which occur along sloping terrain. With its unique bioecology and a diverse ecosystem, the district offers a rich natural environment to support a variety of wild flora and fauna. Of the 12 habitat types in the KP identified by Roberts (1977), three are found in Abbottabad.

Plant researchers have reported 80 endemic species in the Hazara area (Nasir and Ali 1982). Of these species, more than 50% are said to occur in Abbottabad. The district supports approximately



1,300 plant varieties, 18 wild mammal species, 149 resident and migratory bird types, and 19 different reptiles.

**Protected Areas:**

Today, Pakistan can claim 398 “notified” protected areas which include 31 national parks, 92 wildlife sanctuaries, 97 game reserves, 19 wetland reserves and 160 community reserves.

“Pakistan boasts an impressive network of 14 National Parks, 84 Wildlife Sanctuaries and 76 Game Reserves in addition to several reserve forests, protected forests and state forests. However, Pakistan's Protected Areas system suffers from the following shortcomings:

- Haphazard designation.
- The fact that nature conservation reviews have not been carried out (even in internationally designated areas such as Ramsar sites).
- The main focus is on game species; other animal and plant species have been ignored.
- Areas notified under the Forest Act have, simultaneously, been given another designation under wildlife legislation.
- All ecosystems are not represented.
- Some ecosystems are under represented.
- Boundaries have not been worked out according to ecological considerations.
- Communal and privately owned property is not represented.
- Conservation values of PAs are not fully known.
- Critical habitats of many endemic, unique and endangered species are not represented.
- Only a few National Parks have management plans.
- There is no real government commitment to the management of PAs.
- Local communities are not involved in the management of Protected Areas, hence their attitude towards PAs and park management is hostile.

Given this situation, it is evident that there is a pressing need for a Protected Area systems plan to be developed for Pakistan.”<sup>3</sup>

I formally Oppose the Proposed IUCN Protected Area Systems Planning Intervention for Pakistan. Like their Jargon filled Conservation Strategies. We Need Sustainable Development Action Plans, Not Meeting for Eating!

It is a blatant waste of Donor Countries Tax Payer Money; Cultural Invasion Spearhead; Means of Bribing Government Officials with Useless Meetings and TA/ DA etc.; Social Espionage and an Exercise in Futility.

If we are not capable of envisioning our own Plans and Frame Works, then how will we enact them?

Their Developments are based on Negative Principles of Needs, We aim for Positive Assets Based Intervention and Dynamic, Local Languages Based, Step By Step Guides and ACTION PLANS!

Assessing:

## Needs vs.. Assets

NEEDS	ASSETS
Focuses on deficiencies	Focuses on effectiveness
Results in fragmentation of responses to local needs	Builds interdependencies
Makes people consumers of services; builds dependence	Identifies ways that people can give of their talents
Residents have little voice in deciding how to address local concerns	seeks to empower people







### Characteristic Birds of the Himalayas.

Biogeographic Regions of the Indian Subcontinent from the Ornithological Perspective:

**Location:**

**Lesser/Middle Himalayas (3000–3500 m):** This is the middle stretch sandwiched between the Greater Himalayas and the Siwaliks. The Lesser Himalayas largely has sub-alpine conifers and broad-leaf forest.

**Siwaliks/Outer Himalayas (900–1200 m):** The Siwaliks constitutes the southernmost hills that abut the Indo-Gangetic Plains. The broad-leaf forest of the Lesser Himalayas continues into these foothills.

Longitudinally, the Himalayas is divisible into two parts: the Western Himalayas (Pakistan eastwards to western Nepal) and the steeper, moister, warmer, more densely forested and biodiversity-rich Eastern Himalayas (eastern Nepal eastwards to Arunachal Pradesh, and also Northeast Hills). The central part, comprising solely of Nepal, is sometimes referred to as the Central Himalayas.

**Western Himalayas:** This part is characterized by alpine shrub and meadows, sub-alpine conifer forest and broadleaf forest. Protected Areas such as the Smallest National Park in Pakistan (3,312 hectares), The Ayubia National Park; Great Himalayan National Park, and Nanda Devi Biosphere Reserve, including the Valley of Flowers National Park, are situated in this region. About 300-odd bird species are reported from the Western Himalayas. Some of those that are endemic/ near endemic or have a stronghold in this region are the Western Tragopan *Tragopan melanocephalus* (the State Bird of Himachal Pradesh), Koklass Pheasant *Pucrasia macrolopha*, Cheer Pheasant *Catreus wallichii*, Kashmir Flycatcher *Ficedula subrubra*, Kashmir Nuthatch *Sitta cashmirensis* and Orange Bullfinch *Pyrrhula aurantiaca*. The Himalayan Quail *Ophrysia superciliosa* is endemic to this region (Mussoorie and Nainital in Uttaranchal), but this Critically Endangered bird has not been sighted since 1876.

Western Himalayas.

1. Cheer Pheasant *Catreus wallichii*.
2. Himalayan Quail *Ophrysia superciliosa*.
3. Western Tragopan *Tragopan melanocephalus*.
4. White-throated Tit *Aegithalos niveogularis*.
5. Brooks's Leaf-Warbler *Phylloscopus subviridis*.
6. Tytler's Leaf-Warbler *Phylloscopus tytleri*.
7. Kashmir Nuthatch *Sitta cashmirensis*.
8. Kashmir Flycatcher *Ficedula subrubra*.
9. Spectacled Finch *Callacanthus burtoni*.
10. Orange Bullfinch *Pyrrhula aurantiaca*.<sup>4</sup>

The Western most parts of the Himalayas lie within Pakistan to the East of the Indus River. Hazara Division falls within this area and a number of East-West Ranges are to be found. The Sub-Himalayas or 'Siwaliks' are the Southern most Range. This Range does not rise to the heights of the Main Himalayas as Peaks range from 600 to 1,200 meters (2,000 to 4,000 feet). The rocks within this Range are folded, faulted and deeply gullied by the action of streams. The Lesser Himalayas lie to the North of this Range. A part of this Range also falls within Abbottabad District. The Peaks of this Range vary from 1,800 to 4,600 meters (6,000 to 15,000 feet). They too are folded, faulted and over thrust. An interesting Relief Feature lies within this area. The Lesser Himalayas comprise a series of ranges, which form a complex system of sharp bends and abrupt changes in orographic axis. These are described as arc, lobe, orocline, re-entrant, hair pin bend or syntaxis. The North West trending Pir

Panjal Range are linked to the South-West trending Hazara Mountains through a sharp hairpin flexure. This has been variously termed as the North West Himalaya Syntaxis, the Hazara Syntaxis and the Abbottabad Syntaxis, among other names.<sup>5</sup> Hazara Division lies within what is known as the Internal or Abbottabad Zone (hinterland), as opposed to the External or Kala Chita Zone (foreland) of the Indian Plate, in what is essentially the result of Plate Tectonics. Scientific evidence has shown that three Plates, namely the Karakorum, the Kohistan and the Indian Plate collided during the Cretaceous and Early Tertiary Periods. The Indian Plate separated from the Gondwana Continent and drifted to collide at the Main Mantle Thrust (MMT) with the Kohistan Plate. This latter Plate had earlier collided with the Karakorum-Eurasian Plate. Thus the Kohistan Plate is sandwiched between the Karakorum and Indian Plates. The Hazara Mountains are comprised of Crystalline Rocks as opposed to the stratified sedimentary rocks of the Hill Ranges (Margala, Kala Chita and Kohat) Kohat-Potwar Plateau and Salt Ranges. The Abbottabad Zone comprises unmetamorphosed fossiliferous rocks of early Palaeozoic age which overlies a sequence of variable metamorphosed rocks of imprecisely defined Late Proterozoic age.

An estimated 1,300 plant varieties are found in Abbottabad district. In addition, the area is home to 18 mammal species, seven of which are endangered: the common leopard, common red fox, Himalayan palm civet, jungle cat, Murree vole, musk deer and woolly flying squirrel. Of the 149 types of resident and migratory birds found in the district, 109 species have been recorded in Ayubia National Park alone. Two of the four pheasant species of KP are found in the district, which is home to some 33% of all bird species found in the Province. Of these species, 14 are endangered, including the Eurasian woodcock, forest eagle owl, kalij pheasant (*Lophura leucomelanos*), koklass pheasant (*Pucrasia macrolopha*) and warbler (Roberts 1991).

According to the zoological survey department, 19 reptile varieties (nine snakes and 10 lizards), nine indigenous fish species and three exotic fish species are found in Abbottabad. Agricultural varieties include six key species of agrocrops and seven key fruit varieties.

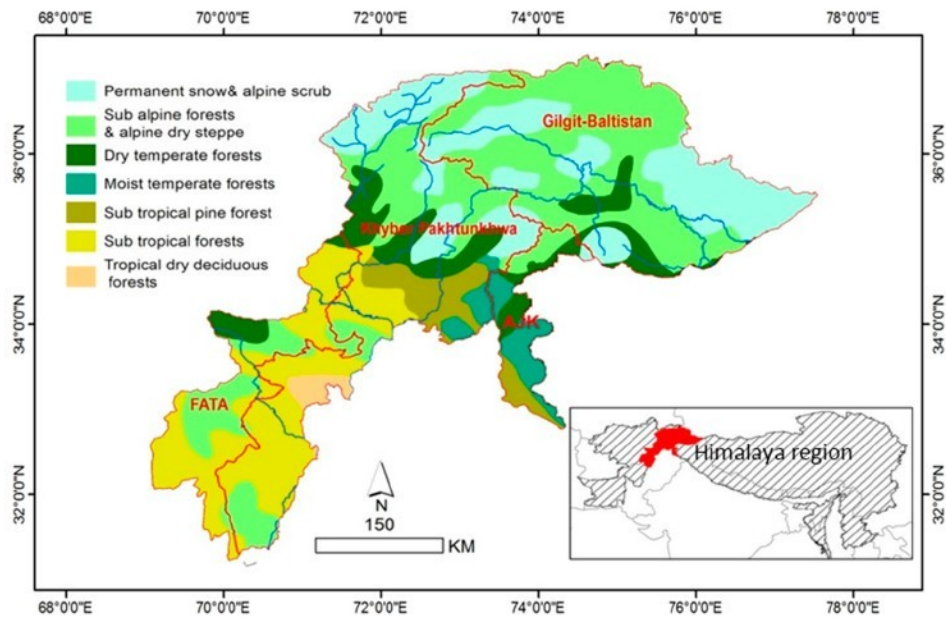
The Himalayan mountain forest ecosystem has been degrading since the British ruled the area in the 1850s. Local understanding of the patterns and processes of degradation is desperately required to devise management strategies to halt this degradation and provide long-term sustainability. This work comprises a satellite image based study in combination with national expert validation to generate sub-district level statistics for forest cover over the Western Himalaya, Pakistan, which accounts for approximately 67% of the total forest cover of the country. The time series of forest cover maps (1990, 2000, 2010) reveal extensive deforestation in the area. Indeed, approximately 170,684 ha of forest has been lost, which amounts to 0.38% per year clear cut or severely degraded during the last 20 years.

In Pakistan, the current forest cover extent and deforestation rates are contentious issues among stakeholders. According to the first comprehensive remote sensing based on a national land cover assessment under the Forestry Sector Master Plan (FSMP), the forest area totals 3.59 million ha, which is 4.1% of the total land area of Pakistan.<sup>6</sup>

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5 State of Environment and Development in the HKH Region of Pakistan, Prof. Dr. Amir Khan, ICIMOD, 2000.

6 Government of Pakistan. Forestry Sector Master Plan; Ministry of Food and Agriculture: Islamabad, Pakistan, 1992.



### North Pakistan Forest Types:

Name	Description
Dense Coniferous Forest (DCF)	Densely distributed evergreen needle-leaved forest with canopy cover greater than 60%, which mainly includes moist and dry temperate Himalayan forest, sub alpine forest and sub tropical pine forest.
Sparse Coniferous Forest (SCF)	Sparsely distributed evergreen needle-leaved forest with canopy cover less than 60% mixed with scrubs, bare areas and grasses/shrubs.
Dense Mix Forest (DMF)	Includes mixed forest of evergreen needle-leaved and broadleaved trees and scrub forest with density more than 60%.
Sparse Mix Forest (SMF)	Includes mix forest of evergreen needle-leaved and broadleaved trees and scrub forest with density less than 60% mixed with scrubs, bare areas and grasses/shrubs.
Dense Broadleaved Forest (DBF)	Densely distributed broadleaved and scrub forest with canopy cover greater than 60%.
Sparse Broadleaved Forest (SBF)	Sparsely distributed broadleaved and scrub forest with canopy cover less than 60% mixed with scrubs, bare areas and grasses/shrubs.
Grasses/Shrubs (GS)	Consists of grasses and shrubs that are difficult to differentiate because of spatial resolution limitations, and shrubs in the upper mountainous region of Pakistan are mainly dwarf shrubs that are found mixed with grasses.
Alpine Grasses (AG)	Alpine pasture above 4000 m elevation fall under this class.
Peatlands (P)	Includes a naturally accumulated layer of peat mixed with standing water mostly found at high elevation.
Agriculture (Cropped) (AC)	Depending on the season, cultivated or agriculture fields are classified into two categories: mature and grown fields are cropped and harvested fields are fallow.
Agriculture (Fallow) (AF)	Harvested agriculture fields.
Bare Soil/Rocks (BSR)	Non-vegetation areas, which include river sand, mud, barren land and rocks.
Snow/Glaciers/Ice (SGI)	Includes both perennial and non-perennial snow and ice.
Water bodies (W)	Includes both small and large water tributaries that can be classified and standing water bodies (i.e., lakes and dams).

### Land Cover Classes:

GIS has revealed that within the agricultural areas, districts with limited irrigation infrastructure have decreased crop areas. The overall decrease in agriculture in such areas is approximately 30% over the last two decades. Most of the reduction is observed in Bannu (70%), Abbottabad (60%) and Swat(40%).



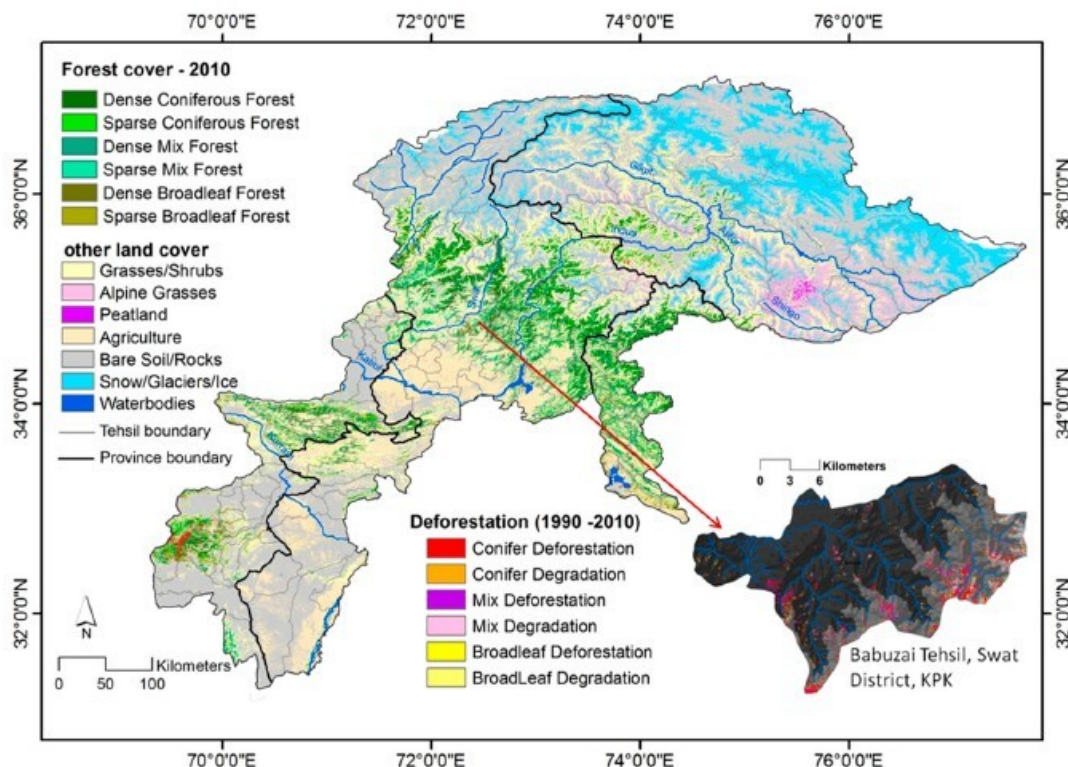
KP					
Land Cover	1990	2000	2010	Change 1990–2000	Change 2000–2010
DCF	567,035	543,111	499,617	–23,924	–43,494
SCF	330,536	330,565	334,134	29	3569
DMF	328,145	318,358	309,457	–9787	–8901
SMF	163,148	158,708	159,254	–4440	546
DBF	89,985	84,332	82,262	–5653	–2070
SBF	155,347	155,793	155,325	446	–468
GS	1,974,390	1,983,299	2,122,648	8909	139,349
P	50,518	77,983	84,943	27,465	6960
AG	58	458	448	400	–10
AC	1,470,512	1,074,197	1,438,651	–396,315	364,454
AF	254,930	760,260	295,761	505,330	–464,499
BSR	4,021,609	3,921,842	4,226,359	–99,767	304,517
SGI	687,802	674,120	401,124	–13,682	–272,996
W	73,587	84,576	57,619	10,989	–26,957
	10,167,602	10,167,602	10,167,602		

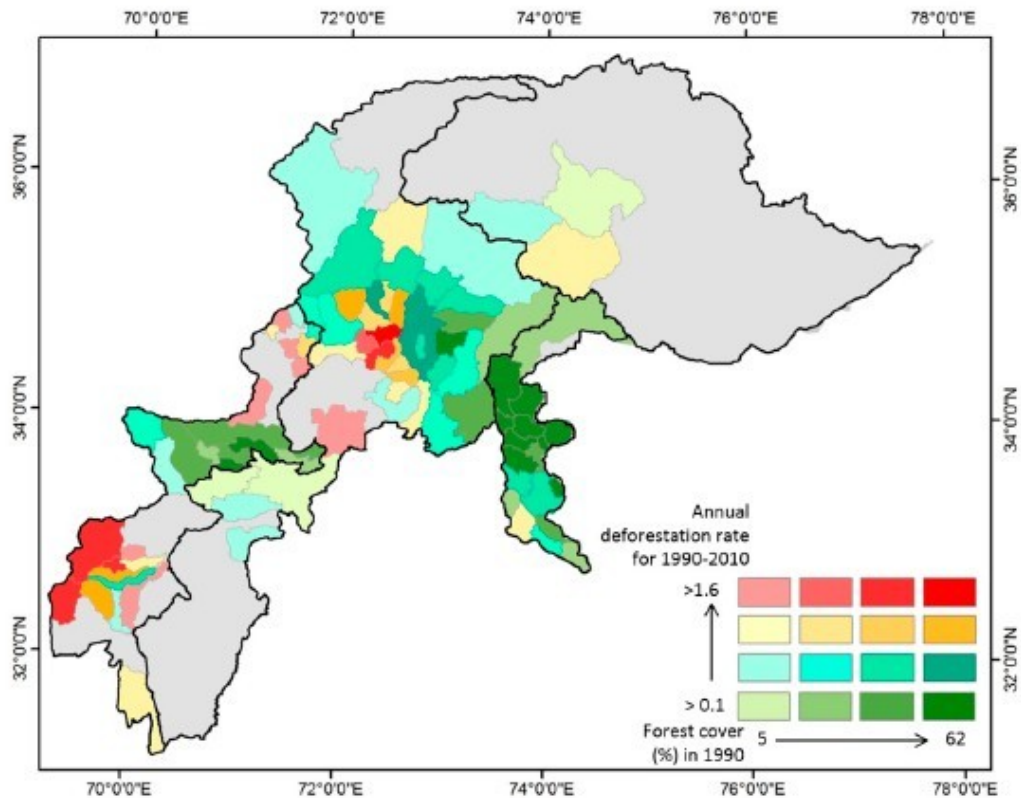
### Time Series Land Cover Statistics.

Province	Total Area	Forest Cover				Forest Cover Change				
		1990	2000	2010	2010%	Deforestation	Degradation	Regeneration	Net Change	Annual Rate (%)
KP *	10,167,602	1,634,196	1,590,867	1,540,049	15.1	112,118	35,108	9974	137,252	–0.42
GB	6,892,214	165,912	164,664	158,233	2.3	7680	2701	2	10,379	–0.31
AJK	1,187,492	459,567	456,997	453,890	38.2	6965	6113	1288	11,789	–0.13
Total	18,247,309	2,259,675	2,212,528	2,152,173	11.8	126,762	43,922	11,264	170,684	–0.38

\* KP including FATA.

### Change in Forest Cover in ha Land Cover Distribution & Deforestation.





**Bivariate map identifying deforestation by showing forest cover and deforestation rate for Tehsils (sub-districts) having more than 5% in 1990.**

According to reference,<sup>7</sup> deforestation in northern Pakistan is occurring primarily because of institutional neglect and there is a need to implement proper forest management strategies. According to reference,<sup>8</sup> historical analysis complemented with satellite images highlights the role of resource rights in forest protection. Specifically, the disconnect between de jure and de facto resource rights has contributed to extensive deforestation over time. The study emphasizes the need to define these rights more clearly, to implement community management systems and to formalize these rights within a legal framework. Considering the on-going demand for wood for fuel,<sup>9</sup> it is possible that the forests in Malakand and Hazara will cease to exist by 2027. Supplies from plantation, agricultural and range lands will only cover 21% of the total demand at this point in time, and an uncovered demand/supply gap of 8.8 million m<sup>3</sup> by 2027 will continue to grow to 13.6 million m<sup>3</sup> by 2050, of which again only 21% can be covered by local woody bio-mass supplies. In this timber demand situation, a decrease in agricultural areas and reductions in populated lands may also bear witness to small-scale tree cutting as an income-generating activity.<sup>10</sup> Reference<sup>11</sup> observed immense deforestation caused by excessive fuel-

- 7 Pellegrini, L. The Rule of the Jungle in Pakistan: A Case Study on Corruption and Forest Management in Swat. Available online: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1017233](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1017233) (accessed on 13 April 2016).
- 8 Khan, S. Assessing poverty-deforestation links: Evidence from Swat, Pakistan. *Ecol. Econ.* **2009**, *68*, 2607–2618. [CrossRef]
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- 10 Fischer, K.M.; Khan, M.H.; Gandapur, A.K.; Rao, A.L.; Zarif, R.M.; Marwat, H. Study on Timber Harvesting Ban in NWFP, Pakistan; Intercooperation Head Office: Berne, Switzerland, 2010.
- 11 Shaheen, H.; Qureshi, R.; Shinwari, Z. Structural diversity, vegetation dynamics and anthropogenic impact on lesser himalayan subtropical forests of Bagh District, Kashmir. *Pak. J. Bot.* **2011**, *43*, 1861–1866.



wood consumption in the Bagh district of Azad Jammu and Kashmir. There are not enough studies exist on associating massive forest loss in mountain region of Pakistan with natural factors like climate, water, landslides, disease, etc.

The observed destruction of forest eco-systems may result in environmental and bio-diversity degradation with loss of function of related ecosystem services such as soil conservation, carbon sequestration and recreational potential. The losses caused by Himalaya's degradation are not confined to the region itself but also seriously affect the environment and economy of the adjoining plains of the Indus basin through disturbances in the hydrological cycle, which contribute to soil erosion, siltation, floods and desertification. The incidence of floods in the Indus river system has been more severe and more frequent over the past 25 years than during the previous 65 years, primarily because of increased surface runoff and accelerated erosion in the Himalayan mountains.<sup>12</sup> According to the Pakistan Water Strategy, the country needs to raise water storage of 18 million acre-feet (MAF) by 2050, where 30% of this figure is only to replace storage loss caused by siltation.<sup>13</sup>

### **Parks and Protected Areas.**

The KP Wildlife (Protection, Preservation, Conservation and Management) Act 1975 provides for the creation of various categories of protected areas: national parks, game reserves and wildlife sanctuaries. In Abbottabad district, two such protected areas have been designated:

- (i) The Ayubia National Park, spread over 3,312 ha, which was established in 1984 with the aim of preserving nature and natural processes in a viable representative area of the Gallies forests.

### **Views of Visitors:**

What's happening in Ayubia?

The Western Himalayan Ecoregion is the catchment area of Indus river. It is responsible for the streamflow of 70-80 per cent of water to the river. The freshwater streams and springs at the park are a significant source of water supply for the residents of the area.

Over the decades, unsustainable land management practices such as fuel wood harvesting, overgrazing and urbanization have led to deforestation, water shortage, landslides and flash floods in Ayubia National Park; the livelihoods of the locals were threatened along with the biodiversity of the region.<sup>14</sup>

A recent Study From Klimatech Environmental Club has been done to sort out the **Deforestation** and Forest fire in the very well Know Natural Park Named "Ayubia National Park" in Pakistan. A team of researchers with the head (Mohsin Jamshaid) leading this research to find out the causes that include natural as well as Anthropogenic sources and as well as mitigation measures – Their findings/ Research has been Published by Envirocivil.com

### **Natural Causes:**

Earthquake.

Land sliding.

Storm.

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12 Tejwani, K.G. Sedimentation of Reservoirs in the Himalayan Region: India. Mt. Res. Dev. **1987**, 7, 323–327. [CrossRef].

13 Mapping Deforestation and Forest Degradation Patterns in Western Himalaya, Pakistan Faisal Mueen Qamer et al © 2016 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/> ).

14 <https://tribune.com.pk/story/1480650/beautiful-ayubias-trees-animals-will-gone-not-conserved>

Flash Floods.

***Anthropogenic Causes:***

Human Fuel/Energy Needs.

Timber Mafia.

Damage by Grazing Animals.

**Impacts of Deforestation:**

Land Sliding.

Decrease in Aesthetic Value and Local Tourism.

Damage to Local Biodiversity.

More Air Pollution Levels.

Mud Floods.

Erosion.

Removal of Nutrients from Soil.

**Mechanism of Fire Ignition:**

People hit the bottom of tree with axe due to which bio fuel (Latex and Resins) comes out which caught fire easily. They ignite this portion due to which roots of that particular tree become dead and after 2, 3 months the whole tree becomes dried and they cut it in portions and allow to fall down to valley under gravity and transport it to required areas.

**Sampling of Trees:**

***No of Sampled Trees along Miranjani Trek (8 km).***

Total Sampled Trees along Right Side: 895.

No. of Burnt Trees: 103.

Total Sampled Trees along Left Bank: 970.

No. of Burnt/Damaged Trees: 89.

***No of Sampled Trees along Ayubia – Dunga Gali Trek (4 km).***

Total Sampled Trees along Right Side: 590.

No. of Burnt Trees: 35.

Total Sampled Trees along Left Bank: 600.

No. of Burnt/Damaged Trees: 55.

**Current Status of Basic Amenities in Study Areas:**

The people of this area are deprived from Natural Gas and other fuel resources because of that they have to be dependent upon forest wood to fulfill their energy needs. Although electricity is provided in most of the region and for water consumption they are dependent upon spring water.

**Solutions:**

Proper check and balance by forest department via providing monitoring platforms in forest at various places to avoid timber mafia.

Provision of alternative sources of energy like biogas plants, RDF for burning.

Creating awareness about importance of forests.

Training of locals to manufacture RDF.

Reforestation.<sup>15</sup>

(ii) The Qalandarabad game reserve, covering 8,940 ha, established in 1980 to protect the biodiversity of the area and promote the sustainable use of game species by issuing shooting permits. Designated protected areas cover only 6% of the landed area of the district.

#### **Biodiversity Loss: The Case of the Potato.**

The fate of various potato varieties grown in Abbottabad, illustrates the general state of biodiversity priorities in relation to economic concerns. The potato is a major horticultural crop in Abbottabad and plays an important role in the rural economy, where it is a cash crop of sorts due to the immediate economic returns that it brings. Common varieties grown in the past originated from the white potato or Irish potato (*Solanum tuberosum*), as well as the local varieties, Kalsi and Lal-e-Faisal. Most of these varieties are either no longer grown in the district or cultivated only sporadically. These varieties fell into disuse for a number of reasons. Compared to the improved cultivars introduced over the years, older varieties produce lower yields. In some cases, quality seeds were not widely available. Other varieties became prone to pest infestation and disease, or degenerated because rejuvenation techniques were not applied. Meanwhile, lighter-skinned varieties also began to lose their popularity with the Province's consumers, who started to opt for red-skinned potatoes. An indigenous variety under cultivation until the early 1980s was the dark-skinned Kalsi.

Although this variety produces low yields, it possesses high tolerance to freezing temperatures and is resistant to blight. Despite these obvious advantages, farmers in the area have long since abandoned cultivation of Kalsi, especially once new high-yielding cultivars became available.

The Potato Research Center (PRC) introduced high-yielding cultivars to the area and transferred production technology to farmers. The PRC also introduced sustainable farming, encouraging growers to diversify cultivation. As a result, valuable crops such as peas and French beans were successfully introduced. These legumes restore the fertility of the soil, while crop rotation helps combat pest infestation.

The PRC uses tissue culture techniques to maintain high-yield cultivated varieties through rejuvenation and virus elimination. In the absence of a germplasm unit at the PRC, however, most indigenous varieties have not been preserved locally. Some farmers in the area continue to grow indigenous varieties but reliable data is not available for this type of cultivation.

The absence of capacity for the conservation of potato biodiversity among PRC staff as well as the farming community has further led to the loss of many indigenous varieties.

Although sustainable development recognizes the necessity of trade-offs, the extinction of local species is too high a price to pay for material benefits. The issue of Biodiversity has for the most part been addressed only indirectly. As a result, no cohesive effort appears to have been made to specifically protect and conserve biodiversity. Species protection, the designation of protected areas, public and private land management, and pollution control may at best be viewed as partial and limited measures.

#### **Management of Local Resources.**

Local communities must be legally empowered to manage natural resources in their own areas, and to share in the income derive from the sustainable use of biological resources. Doing so will increase their stake in participation and strengthen their commitment to biodiversity conservation. Given the long history of management characterized by policing and the exclusion of stakeholders, attempts to build relationships between conservation managers and local communities have achieved

mixed results so far. Government officials continue to demonstrate an aversion to participatory practices, the so-called turf orientation.

Lip Service stating “Community Participation” by INGOs is a Farce as materials and Books are in English; Outcomes are in English and the Final Plan is also in English!

### **Legislation.**

The declaration and management of reserved forests carried out by the British colonial administration was the first real initiative of its kind. Two colonial laws governing the management of forests, the Forest Act 1927 and the Hazara Forest Act 1936, were in force until as recently as 2002, when they were repealed by the KP Forest Ordinance 2002. Incidentally, the 1927 Act, which is a Federal law, remains in force throughout the rest of the Country.

Today, a number of laws provide legal cover to protection and management initiatives for forests and wildlife in the KP. These include the West Pakistan Goat Restriction Ordinance 1959, West Pakistan Wildlife Protection Ordinance 1959, West Pakistan Fisheries Ordinance 1961, KP Wildlife (Protection, Preservation, Conservation and Management) Act 1975 and KP Forest Ordinance 2002.

### **Protected Areas.**

The 1975 Wildlife Act provides for the creation and management of various categories of protected areas: national parks, wildlife sanctuaries and game reserves. Consumptive use, including hunting, trapping, grazing and fuel wood or timber collection, are restricted within the perimeters of a national park. In game reserves, however, harvesting is authorised and practised.

The protected areas system covers just 6% of the land area of Abbottabad. The European Union has helped to prepare a management plan for Ayubia. But The IUCN wants to Prepare another. Apart from these notified areas, forests spread over 127,449 acres (26% of district's land area) are under the protection and management of the Galliyat Forest Division.

Communities living in the vicinity of protected areas depend heavily on natural resources for timber, fuel wood and fodder. Without being compensated for transformation costs, they are not likely to welcome any change in the use regime. They have not been empowered or provided with viable alternates, except for Show-Time Projects that have eaten up vast sums with No or Little On-Ground Results.

Before all else, an Impact Analysis of NGO; INGO and Government Development Projects must be undertaken and Tax Payers Money Recovered!

The resentment bred among communities in the Ayubia National Park area is a case in point. Centralized control over management and distribution of the benefits from the use of natural resources have frustrated local attempts to plan land use around Ayubia. In addition, the construction of a large number of houses and hotels around the Park threatens the very purpose for which it was demarcated as a protected area.

Recently, the Prime Minister and His Advisor on Climate Change are Pushing for not one but two Multi-Story 5-Star Hotels INSIDE the Park which is also a Leopard Preserve. Plots are being carved out for top Bureaucrats in blatant disregard for National and International Laws and Multi Lateral Agreements. All this in the name of “Green Initiative!” It seems that they have mistaken GIS to stand for Green Initiative Scam! What to talk of Stakeholders, not even the concerned Line Departments of the KP Government (Forests & Wildlife Departments) have been consulted in this regard.

### **Policy and Implementation Milieu.**

As part of the larger fabric of insights regarding work in this sector, the lessons learnt from the Swiss Development Corporation experience are equally valid for future biodiversity management interventions in Abbottabad.

A case study based on the SDC's work shows that the management of natural resources and biodiversity in a dysfunctional policy and implementation milieu can only achieve limited success.

When conservation issues come into conflict with the basic needs of the people, conservation is invariably relegated to the backburner. In such a scenario, the macro framework needs to be reformed and institutional transformation is required.

The introduction of change must be in tune with existing political and decision-making processes. At the same time, political and decision-making processes themselves will have to change.

Community-based systems for the management of natural resources and biodiversity must be developed, and local ownership for such initiatives has to be translated into binding covenants, bolstered by political will and institutional support.

In this connection, the Institutional Transformation Cell, created by the KP government in 1998, but disbanded four years later, was a step in the right direction.

The issues of governance, management and development are intricately intertwined. Sectoral policies, that bypass the macro policy environment, can only yield limited results. Changing management and development practices, requires sustained, long-term commitment. While the district administration and civil society should be allied in this effort, donors also need to act in areas where they possess a relative advantage. Strategies that are not backed by commitment and resources are nothing but futile exercises. Public opinion looks for concrete evidence of action, and the eventual success of conservation efforts derives from realistic action.

### **Water Courses.**

The District is partly bounded by the Siran River in the North-East and the Jhelum River in the East. The District is mainly drained by the Dor and Haro Rivers with many smaller tributaries known as "Kattahs". Unlike the rivers of the Punjab plains, these rivers are eroding material, not depositing it. The erosion is very active and has resulted in deep gullying.

### **Fish Species Diversity:**

An estimated 117 km of rivers and streams run through the district, in addition to countless springs. The fisheries potential of these resources is yet to be systematically analyzed. In 1998–99, the district produced 0.74 t of fish, marking a 56% decline from the previous year (1.66 t) and a massive 89% fall since 1996–97 (Go KP 1999). The cash value of Abbottabad's fisheries output for the period 1998–99 is said to be Rs 50,050 but this figure needs to be re-examined since the total provincial fisheries output during the same period is valued at Rs 40.397 million.

### **On-Ground Status:**

Only two water bodies in the district have been the subject of limnological analysis. The first of these is the Thandiani stream at Kalapani, which is rich in nutrients and offers an environment that is favourable for pisciculture, especially trout farming. This stream ranks high on the habitat quality index for the KP (Stockwell 1995). Indigenous fish species such as the *masheer* are also worth developing, although care must be taken to stock the stream in accordance with its carrying capacity. The other water body that has been analyzed is the Daur river, which favours carp culture, particularly for species

already found in the river (Khan 1988). The remaining water bodies in the district need to be limnologically studied before measures can be taken for enrichment. In general, fish biodiversity increases from the upper to lower reaches of a catchment area.

Limnological analyses have not been undertaken on the rivers and streams that flow through the district to understand how fisheries resources may be enriched. Meanwhile, the impact of waste and pollution, the diversion of water for agricultural purposes and improper planning have undermined the health of the sector.

The key lesson learned from past experience is that aquatic resources need to be explored and developed as part of an integrated strategy to address poverty alleviation and curtail undue pressure on natural resources. The public-private fish farming initiative launched in Madyan (Swat) needs to be studied for possible replication in Abbottabad. At the same time, adequate legislative cover must be made available and participatory interventions developed for the sector, backed by resources and capacity building.

### **Watersheds.**

The main Murree–Thandiani mountain ridge divides the district into two distinct watersheds: the Indus (covering 78.7% of the area) and the Jhelum (covering 21.3% of the area). According to the Forestry Sector Master Plan, total soil loss is estimated to be 2.8 million t annually (75.4% attributed to the Indus and 24.6% to the Jhelum). Various spurs of the main ridge divide the district into seven sub-watersheds, as follows:

- i. Haro: 42,137 ha;
- ii. Siran: 35,419 ha;
- iii. Jhelum: 22,880 ha;
- iv. Daur: 19,564 ha;
- v. Kunhar: 15,272 ha;
- vi. Sokah Nullah: 12,627 ha; and
- vii. Indus: 1,964 ha (Hussain et al, 2001).

The topography of each of these watersheds is distinct, as are cultivation practices, forest types and soil erosion issues.

### **Forest Management and Ownership: Historical Context.**

The history of forest management in the Hazara area dates back to 1851, when Lord Dalhousie, Governor General of colonial India from 1848 to 1856, created a new category of ‘reserved’ forest, marking the first time that any special type of forest area was designated in the region. *Guzara* forests were demarcated in 1873 while cantonment and location forests were first carved out of *guzara* forests towards the end of the Nineteenth Century.

Thereafter, working plans were used to make alterations to the management of various forest types.

Although responsibility for many other sectors has been devolved to the district level, forest management continues to lie within the jurisdiction of the Provincial Government. Currently, 15,558 ha of reserved forest, 8,225 ha of *guzara* forest and 808 ha of cantonment and location forest are managed by the Gallies Forest Division through five ranges: Abbottabad, Bagnotar, Birangali, Dongagali and Thandiani. In addition to these areas, the divisional forest officer of Haripur manages 3,852 ha of reserved forest and 2,960 ha of *guzara* forests through the Makhnial and Satura ranges.



Besides 25,704 ha of forest land spread over 31,403 ha of designated forest, another 10,737 ha of forest covers the district, including non-designated private forests (*mazrooa*) and established watershed plantations. Reserved forests cover the greatest area (62%), followed by *guzara* forests (36%), and cantonment and location forests (2%).

### **Forest Types.**

Forests in the district consist of three major forest types:

- i. **Himalayan moist temperate forest.** This category accounts for the majority (67.4%) of Abbottabad's forests and consists of the following sub-types:
  - a. Pure blue pine (*Pinus wallichiana*), known locally as *kail*, occupies by far the largest area in this category, covering 12,000 ha (38.8% of designated forest). It accounts for over 50% of reserved forests and 30% of *guzara* forests in the district.
  - b. Pure silver fir (*Abies pindrow*; also known as *Abies wabiana*) occupies 2,500 ha, comprising 8.6% of the district's total forest cover, mostly occurring at around 2,600 m. While pure blue pine forests are fairly well stocked and regenerating adequately, silver fir regeneration is deficient, particularly in pure patches.
  - c. Mixed coniferous forests containing blue pine and fir as well as deodar (*Cedrus deodara*) and spruce (*Picea smithiana*).
  - d. Mixed broad-leaved forests occur in greater proportion in the Gallies reserved forests, serving as a source of firewood for both Abbottabad and Murree. Excessive lopping and cutting for fuel has drastically reduced its size.
- ii. **Subtropical pine forest.** Pine is spread over 5,540 ha (17.7% of total forest cover) and occurs at 1,060–1,670 m. The main bulk of *chir* pine (*Pinus roxburghii*) forests are reported in Lower Tanawal, Makhnial and Satura. The crop is stunted, open and patchy, with no sizeable continuous block reported. The Tarbela-Mangla Watershed Management Project has provided a boost to plantation.
- iii. **Subtropical broad-leaved scrub forest.** Scrub covers an area of 4,690 ha (constituting 14.9% of the district's forests) and mainly occurs at elevations below 1,060 m. This forest type is extremely degraded, open, patchy and exposed to heavy pressure from fodder and firewood collection as well as browsing. Wood from these forests is also taken to make agricultural implements.

### **Stocking and Composition.**

Average forest stocks in Abbottabad stand at 223m<sup>3</sup>/ha. An increment of 192,905 m<sup>3</sup> is reported, 83% in the shape of round wood and 17% as branch wood (KfW 2000).

*Kail* is the dominant species (at 71%), followed by fir (19%) and *chir* (10%). Fir is the second most common species (41%), followed by other broad-leaved varieties.

### **Gallies Reserved Forests.**

Based on information gathered from forest plans dating back to 1887, a total standing volume of 487,737 m<sup>3</sup> has been exploited commercially until the year 2001, at an average rate of 4,278.4 m<sup>3</sup> annually.

### **Gallies *Guzara* Forests.**

Estimates based on working plan prescriptions show that an average of 521 m<sup>3</sup> has been removed annually over the last 51 years.

### **Cantonment and Location Forests.**

A total standing volume of 648,652 m<sup>3</sup> has been harvested over the last 114 years, at an average of 56,901 m<sup>3</sup> per annum.

Actual harvesting is estimated to be significantly higher than these figures, largely as a result of illegal felling. Meanwhile, regenerative capacity has been estimated at 192,904 m<sup>3</sup>. Annual increments reported in management plans work out to an average of 61,049 m<sup>3</sup> per year for all forest types.

Forests are a major component of the district's economy, and figure prominently in natural resource management initiatives. Such projects cover a wide range of activities from legal protection to work aimed at preventing forest degradation.

### **Working Plans:**

Reserved forests in Haripur and the Gallies have been managed under regular working plans since 1878 and 1906 respectively. Similar plans for the *guzara* forests of Haripur and the Gallies were introduced in 1965 and 1966 respectively. The adoption of working plans has not always served to benefit forest resources, particularly since working plans have been subject to frequent, arbitrary revisions and extensions.

Until 1878, the forest department operated without working plans, much to the detriment of forest resource conservation. Even after working plans were made operational, their efficacy was hindered by the failure to accommodate the needs of local communities. Working plans have also been marred by the department's timber orientation, as opposed to an integrated natural resource management approach. Partial implementation, the absence of monitoring and coordinating mechanisms, and repeated revisions and extensions spurred by vested interests, have all served to defeat their original purpose.

As a result, working plans are no longer considered a credible means to promote conservation or curtail illicit felling.

Government-sponsored activities in the forest sector are characterized by a series of absences: continuity, timeliness, rational policy evaluation, community participation and interactive management have all been missing.

Instead, ad hoc decision making, administrative inefficiency and myopia have been prominent features of many such initiatives.

The forest department, originally created to manage state forests, has not succeeded in taking owners on board in matters of forest management. Mere policing is a recipe for disaster. Indeed, it has become painfully clear that the forest department cannot conserve forests through policing alone. Community involvement, based on trust and an understanding of mutual long-term interests, is the only way that the department can improve its performance.

Local communities should be involved in private forest nursery raising, on Non-Political Basis, which would increase overall forest cover, boost the income of the rural poor and increase their stake in conservation.<sup>16</sup>

### **Biodiversity of Fauna:**

Do we even know that over 90 species of mammals, reptiles and birds (Avifauna) are approaching the critical stage of extinction in Pakistan. A few mammals sadly have been reported to have vanished from the wild in Abbottabad District. These include the white-bellied Himalayan Musk

Deer *Moschus leucogaster*; The Himalayan wolf *Canis lupus chanco*; The Cheer Pheasant *Catreus wallichii*; The Kalij Pheasant *Lophura leucomelanos*; The Spot-Bellied Eagle-Owl *Bubo nipalensis*; The Golden Eagle *Aquila chrysaetos*; *Himalayan Griffon (or Himalayan Vulture)* *Gyps himalayensis*. ; The Barking Deer or Indian Muntjac *Muntiacus muntjak*; The Black Wood Partridge *Melanoperdix niger*; The Chukar Partridge (*Alectoris chukar*); Some of the world's most cosmopolitan species The Peregrine Falcon *Falco peregrinus (winter migrants Raptor)*; The Himalayan Goral *Naemorhedus goral*; The Himalayan Monal *Lophophorus impejanus*; The Kashmir or Hill Fox *Vulpes vulpes griffithi*; The Honey Buzzard *Pernis ptilorhynchus*; and The Saker Falcon *Falco cherrug*;

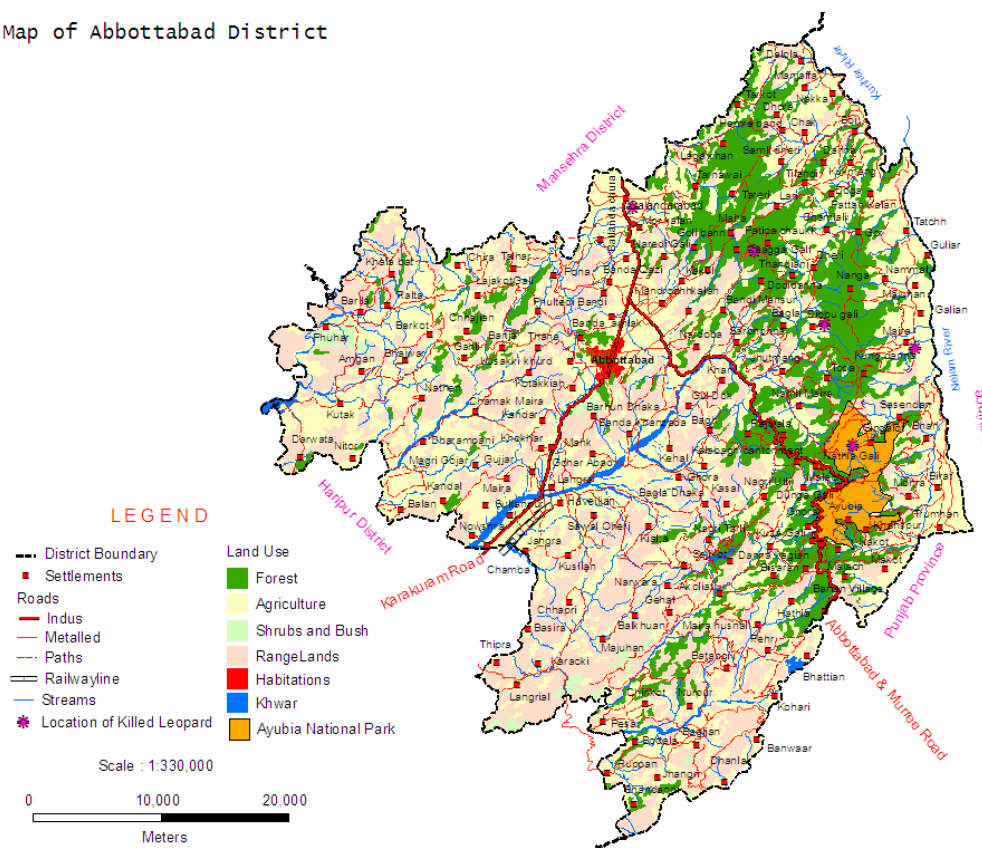
The animals extinct from Pakistan include the Tiger; Asiatic Lion; The Asiatic Cheetah (*Acinonyx jubatus venaticus*) and Indian Horned Rhinoceros.

The Wildlife of Pakistan has reported that a few other animals including The Indian Wild Ass, Hangul, Siberian Crane, White Rumped Vulture, Long Billed Vulture, and Hawksbill Turtle are vulnerable to extinction. Besides, several animals are endangered including Kashmir Grey Langur, Indus Dolphin, Finback Whale, Balochistan Bear, Green Turtle, Musk and Hog Deer and Indian narrow headed Turtles.

The International Union for Conservation of Nature has exhibited 37 Species of Mammals, which are Facing Threats of Extinction and are Continually Endangered.

The Species that are Long extinct from what is now Pakistan include: *Paraceratherium*, an extinct genus of hornless rhinoceros, The first fossils were discovered in what is now Pakistan; The Asian Elephant (*Elephas maximus*); *Dalanistes*, an extinct genus of remingtonocetid early whale known from the late early Eocene (Lutetian, 48.6 to 40.4 million years ago) of Kutch, India and Punjab and Balochistan; *Ichthyolestes* ("Fish Thief"), an extinct genus of archaic cetacean that was endemic to Indo-Pakistan during the Lutetian stage; *Nalacetus*, an extinct Pakicetid early Whale, fossils of which have been found in Lutetian red beds in Punjab, Pakistan (33.6°N 72.2°E, paleocoordinates 14.3°N 68.3°E). *Nalacetus* lived in a fresh water environment, was amphibious, and carnivorous. It was considered monophyletic by Cooper, Thewissen & Hussain 2009. It was said to be wolf-sized and one of the earliest forms of the order *Cetacea*. *Pakicetus* is an extinct genus of amphibious cetacean of the family Pakicetidae, which was endemic to Pakistan during the Eocene, about 50 million years ago. It was an animal rather like a wolf, about 1 metre (3 ft 3 in) to 2 metres (6 ft 7 in) long, and lived in and around water where it ate fish and small animals. The vast majority of paleontologists regard it as the most basal whale, representing a transitional stage between land mammals and whales. It belongs to the even-toed ungulates with the closest living relative being the hippopotamus.

Map of Abbottabad District



### Abbottabad District Details:

Abbottabad District falls within the Wet Mountains Agri Eco Zone. The Average Annual Rainfall in Abbottabad District is 2,673 mm and the Climatic Division, Based upon the Classification by Ahmad,(1951) is the Sub-Humid Division of the Subtropical Continental Highlands. This is Characterized by Rainfall from both Monsoon (July to September) and Western Disturbances (December to April), giving a Twin Peak Type Distribution with the Maximum Precipitation Occurring in July to September. October and November are the Driest months with less than 30 mm rainfall. The Galliyat area of Abbottabad District receives about 89 rainy days a year, or one fourth of the year. The Murree – Gallies Mountain Areas are the Wettest Mountains in Pakistan. The summers of the District were Pleasantly Cool (20 – 26 C) while now they have risen to a high of 24 C in April and 27.95 C in September with a maximum of 32 C in June. This is entirely due to Unplanned and Rapid Urbanization and Rapid Population increase (In-Country Migration) and resultant deleterious effect upon the Micro climate of the area. Winters are Severe with Considerable Frost and Small Quantities of Snow in the Month of January. Humidity in July and August is greater than 70 %. It ranges between 40 to 70 % during the rest of the year, at no time does the Humidity fall below 40 %. Thus there is no great Stress upon humans or plants. Relative humidity below 40 % causes parching of human skin, and plant's foliage due to increased evapo-transpiration. Thus the yearly mean humidity of Abbottabad District is 60 %.

“The average increase in mean maximum temperature is  $\pm 0.67$  °C. The contribution of urban warming to the total mean annual temperature is 2.87 % in five decades. The average decrease in temperature is  $\pm 2$  °C. The maximum temperature indicated an increasing trend while the minimum temperature had a decreasing trend.

The concentrations of unplanned growth in cities are generally overwhelmed by problems such as the deterioration of infrastructure and subsequently pose immense environmental problems. As a consequence, far-reaching impacts are expected on streams due to altering temperature and runoff regimes, increasing the frequency and intensity of droughts and floods in other areas (Milly et al. 2005; Alcamo et al. 2007). Anticipating the combined environmental impacts of anthropogenic changes due to urbanization is critical to develop proactive strategies for protecting ecosystems and the services they provide (Clark et al. 2001; Walsh et al. 2005; Palmer et al. 2008 a, b). As a direct result of urbanization, great threat to health and safety in cities comes from water and air pollution. Uncollected and improperly handled solid waste can have serious health consequences. Natural land areas like forests and wetlands are fast transforming into urbanized areas wide across the globe. Regional or microclimatic changes in large cities from their surroundings are now more noticeable to the scientists (Ichimura 2003).”<sup>17</sup>

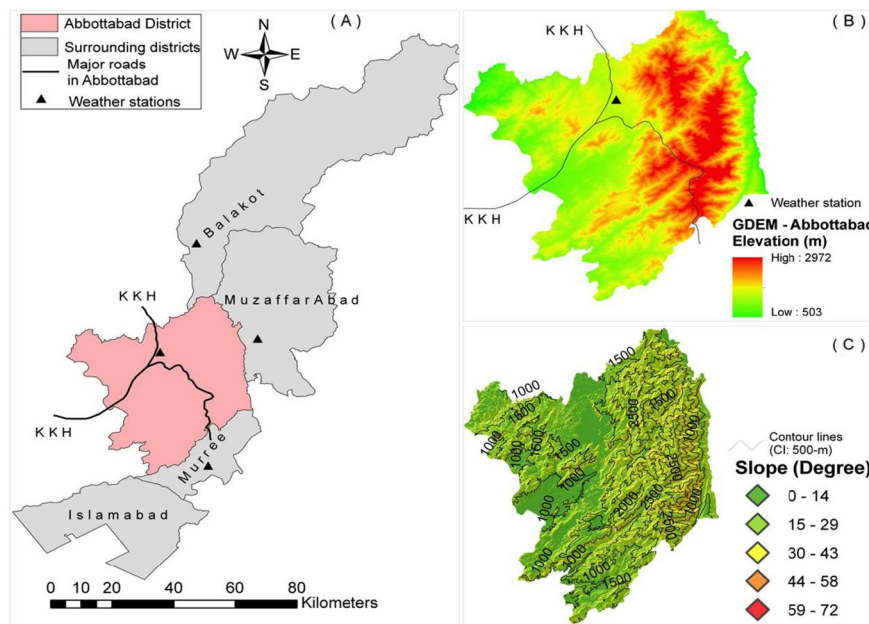


Fig. 2 Location map of Abbottabad and surrounding climate stations.

GDEM of Abbottabad with contour lines and slope is also presented. A The location of the study area with the surrounding districts and their location. b A physical map of Abbottabad district with information on its elevation. c The contour map of the study area showing the direction of the slopes

#### Digital Elevation Model of Abbottabad:

The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), Global Digital Elevation Model (GDEM) was used to analyze the elevation change in the study area. The

GDEM for Abbottabad district was extracted from the original scene by using the administrative boundary shape file. The ASTER GDEM based on ASTER images is available for high-latitude and steep mountainous areas not covered by SRTM3 (METI 2009). The GDEM of Abbottabad with contour lines, slope (in degrees), and location of the surrounding climate stations is presented in Fig. 2.

Analysis reflects a larger population. The major reason for the population surge, which resulted in a higher number than the estimate can be the earthquake of 2005 which resulted in the heavy influx of people compelled to concentrate in the city from surrounding earthquake-hit areas (Arif and Hamid 2009). Moreover, the degree of migration rate for economic activities can be an added reason other than the natural growth rate of a city's population.

In the decadal analysis of TMean, a contrast was found between TMax and TMin. The average increase during 50 years' time in TMax was  $\pm 0.67$  °C. The contribution of urban warming to the total annual TMean in five decades was 2.87 % (Hua and MaZG 2007 and Zhang et al. 2010). On the contrary, the TMin of five decades depicted an inverse trend. The TMin record showed an average decrease in temperature which was  $\pm 2$  °C that indicated a climatically significant decrease in TMin.

In the time series analysis of RFall, it was found that during the decadal period of 2001–2010, the mean amount of RFall in Abbottabad was 1,197 mm, whereas it was 1,407 mm during the decade of 1981–1990. A similar study entitled “Impact of Global Warming on Monsoon Variability in Pakistan” was carried out in 2011 (Ghaffar and Javid 2011). The deficiency of RFall during 1981–1990 was found to be 210 mm if compared with decadal timings of 2002–2010. Studies suggest that the particulate matter provides nuclei for the condensation of atmospheric moisture into RFall (Shashua-Bar et al. 2010; Emmanueh and Johansson 2006). A sufficient amount of climatic data of different cities also supports that as cities grow in size the RFall in the city proper increases. However, in the case of Abbottabad, the inverse pattern of RFall needs to be investigated over a large geographical area surrounding the location of the city. This approach may give a more clear reason about the tendency of decreased Rfall. The nearest weather stations around Kakul (Abbottabad) are Balakot in the north, Garhi Dupatta (Muzaffarabad) in the east, and Murree which is located slightly in the southeast direction. The radius of these stations is between 20 and 30 mi as shown in Fig. 2. This study provided an approach to verify through climatic data of weather stations in the near vicinity of Kakul that the variability in TMean and RFall was because of urbanization or there is a regional climate change in progress.

Further exploration is required to analyze the effect of urbanization and microclimate change (Eliasson 2000; Thapar and Yannas 2008). It has been proposed that the concentration of heat in urban heat islands arises from a combination of factors, including replacement of vegetation by heat-absorbing concrete and asphalt surfaces, reduced air mixing, motor vehicle emissions, and other anthropogenic heat sources (Lee et al. 2009).

Climate change in general and especially the microclimatic changes in a city region are much too complicated to be described by a single parameter (Garrett et al. 2011). In this study, the single parameter of urbanization was selected to see the influence on temperature and RFall in a city region. After comprehensive analyses of climatic data of TMean and RFall, it was found that there were noticeable changes in both the climatic phenomena. Climatic variables of TMean and Rfall may also be investigated through other angles. Nonetheless, the results of the present study support and address the statement of the problem.



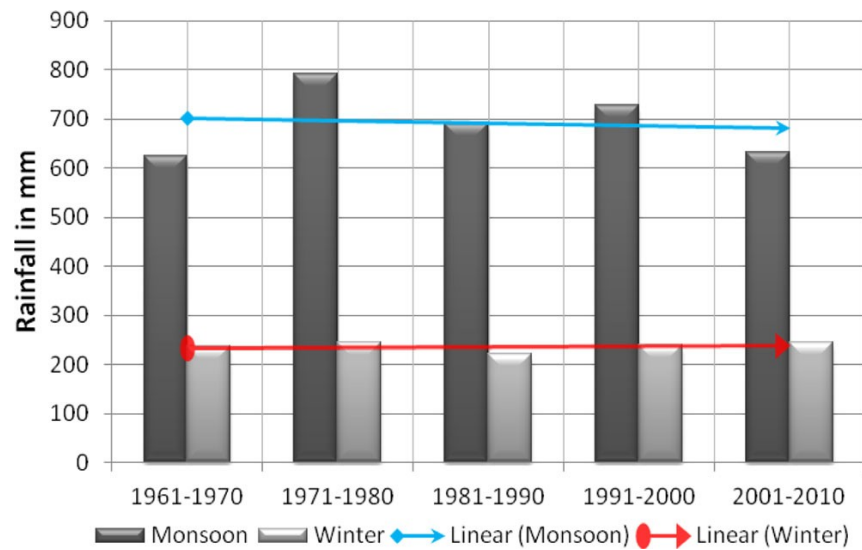


Fig. The overall trend of RFall in seasonal settings of winter and monsoon during 50 years

#### Analysis:

Investigating the influence of urbanization on the microclimate of any city or urbanized area is a complex procedure as many effects are intertwined in the creation of climatic change. The present study has made an endeavor to provide evidence that there is a relationship between urbanization and microclimatic change in terms of TMean and RFall at different periods of time.

The climatic condition of Abbottabad is a mainstay for dwelling and economic activities of the people. The city region and adjoining areas need better prediction about temperature and RFall not only to fulfill their needs depending on nature but also to take proactive measures in order to avoid drastic climatic and environmental change in the near future.

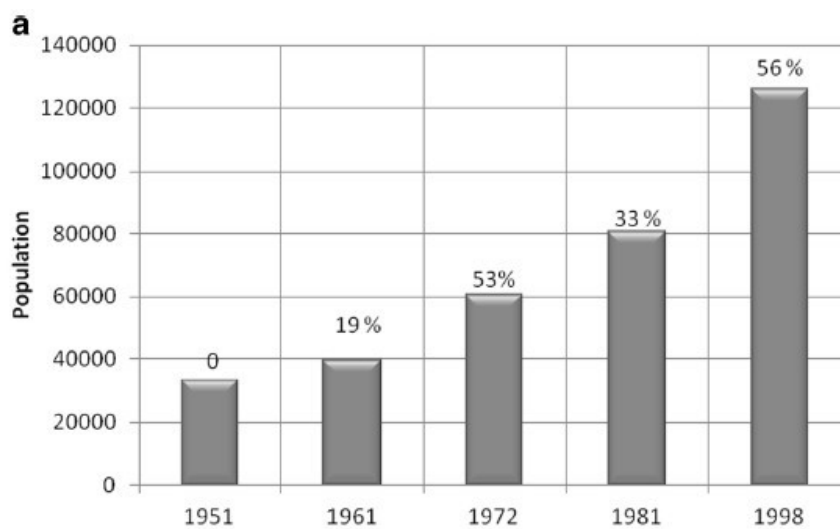
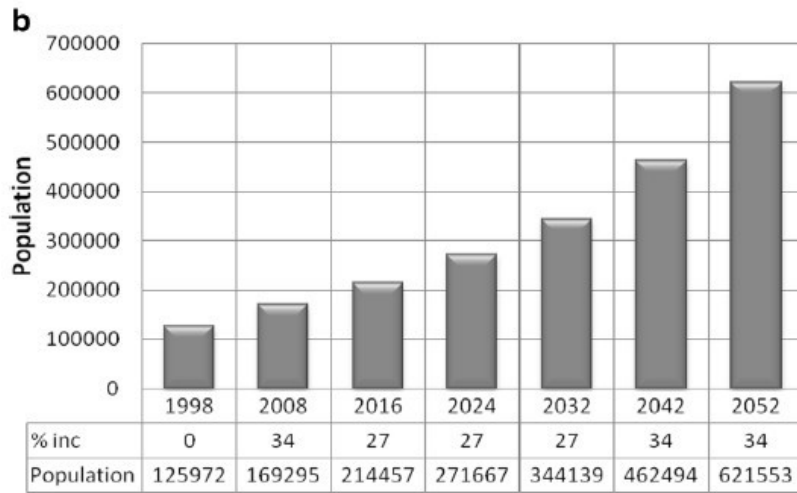


Fig. Population of Abbottabad

City at different census periods with percentage intercensus change in population (a) with reflected increase in trend (b)



### Results: The trend analysis of population

Urban growth is a pejorative term for the expansive, often explosive and sometimes reckless growth of the metropolitan area. The percentage change of the population (by taking the year 1951 as a baseline) and linear trend during 1951–1998 are shown in the above Fig. During two intercensus timings, i.e., between 1961–1972 and 1981–1998, the largest increase of population was found. In percentage, the increase can be expressed as 53 and 56 %, respectively. This rapid increase of population linked with speedy development of

Table: Climatic records (temperature and rainfall) of Abbottabad over 20 years (1991–2010)

Month	Temperature (°C)	Rainfall (mm)	Max	Min
January	13.01		0.66	79.22
February	14.31		2.27	106.20
March	18.83		6.22	126.14
April	24.28		10.56	111.68
May	29.02		14.57	61.17
June	32.02		18.18	105.61
July	29.93		19.36	244.67
August	28.70		18.93	220.37
September	27.95		15.87	108.62
October	25.39		10.35	44.44
November	20.94		5.77	30.68
December	16.10		2.32	44.05

### Air Quality Atmosphere.

Health infrastructure and urbanization must have an impact on the microclimate of the city. The future trend of urbanization extended over the next 50 years revealed that the growth percentage of the population (1998–2052) was increasing between 27 and 34 %. The population increase during 1951–1998 was 3.8 times; however, the rate of increase for 1998–2052 will be 4.9 times resultantly

showing an exponential growth in the next 40 years if seen from 2012. To see the trend analysis, the percentage increase and projected population are shown in the above Fig.

### Discussion:

Abbottabad City is a hill station and is more influenced by urbanization and human activities. It has been suggested that the urban climate system is very complex which is comprised of many components like air pollution and thermal characteristics (Ndetto and Matzarakis 2014). Investigating the influence of urbanization on the microclimate of any city or urbanized area is a complex procedure as many effects are interlaced in the creation of climatic change (Zhang et al. 2010). The major reasons for climatic change can be different from one area to the other; however, the basis of any effect in an urbanized area generally remains interlinked with human activities. Meteorological observation started as early as in the nineteenth century with rainfall being the most sampled environmental parameter in terms of spatial distribution, hence providing a potential for future research and comprehensive understanding of the urban climate (Ndetto and Matzarakis 2014).<sup>18</sup>

**Table 1** Climatic records (temperature and rainfall) of Abbottabad over 20 years (1991–2010)

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In the meantime, over the years, according to a prominent Local Environmentalist:

“British Era Bungalows in Abbottabad were allotted to fake politicians in free grant. The People did not speak. Rivers and Stream Beds were occupied, Plazas were built, People died due to floods, The People did not speak. The Mona Lisa Restaurant was snatched from the Public, The People did not speak. Then the historic design of Lady Garden was destroyed for a Commission of Rs. 110 Million, The People did not speak. Streams and Green Hills, Common Property (Shamlat) were taken over by their Pet Land Mafia and the City was flooded, The People did not speak.

Then, fearlessly, they snatched the entire Abbottabad Club and built a Concrete Wedding Hall there, The People did not speak.

Then Lady Garden's Rose Garden was snatched from the People and handed over to the Land Mafia who had infiltrated the Ruling Political Party, in exchange for a bribe, for installing circus swings. The Innocent Children died when the Swings Broke, The People did not speak.

The Exploiters Spirits Soared. By imposing a Fake Government on the People, it has increased Inflation by 200 percent, The People did not speak.

The Green and Open Space Central Space for Offering Eid Prayers (Eid-Gah), Planted with Century Old Trees, of Abbottabad City was Ruthlessly covered with Concrete leading to the death of the Trees, The Lungs of Abbottabad City, the People did not speak.

Now, seeing the silent people, their boldness increased so much that Property Tax was increased twelve times. Against which the people of Abbottabad have now spoken. They have adopted the legal path. Instead of Blocking the Road and taking the Law into their own hands, the naive people have taken the Black Britishers to court. Their Servants smashed Journalists' Cameras while trying to seal and occupy the an Outspoken Citizens Welfare Societies offices. The people have spoken now and we can call it a silent and soft revolution”!

A Number of Parks, Reserved Forests and Sanctuaries exist in small Pockets all over Abbottabad District. Of these, the most well known is the Ayubia National Park, situated in the Sub-Mountaineous Tract of The Galliat, Abbottabad District, surrounded by local communities that are dependent on Park Resources for their subsistence. leading to Resource Depletion within the Park,

“The Himalayan Region is the World’s Highest and Geologically Youngest Mountainous Province (Burchfiel & Royeden, 1985) with Distinct Biodiversity and is therefore Important for Ecologists and Biodiversity Conservationists of the World (Mahagaonkar *et al.*, 2017).

Ayubia National Park (ANP) (was established in 1984 and is) a Classical Example of (The) Moist Temperate Region of Pakistan. It is a Protected Area (which) Spreads (over) 33 sq km (or 8,184 acres of) land Cover. Approximately 50,000 Inhabitants are Residing around the Park in Seven Major Villages (Afza *et al.*, 2004). The Park is a part of (The) Lesser Himalaya(s) extending from North to South at 34°1' to 34° 3.8 'N and 73° 22.8' to 73° 27.1' E; Spreading between an Elevation Range of Approximately ±1450 – 3,033m of 9The) Galliat Region, District Abbottabad, Pakistan.”<sup>19</sup>

The Park is bounded on the North by Namli Maira and Phalkot Reserved Forests while portions of Bakot, Darwaza Reserved Forests, and the village of Khanuspur lies in the South. Birot Reserved Forest and Lahur Village lies in the East, whereas Bagh Reserved Forest and Villages of Kalabagh, Nathiagali, Kundla, and Tohidabad lie to the West of the Park. A Bird Sanctuary, about which little is known and less published, has been established by EU Funding in the Mushkpuri Top Area. Mukeshpuri is a 9,200 feet high second highest Mountain in the Nathiagali Hills. It can reached by trekking either from Nathiagali trek or Dungagali trek. It is 90 kilometers North of Islamabad, Pakistan, just above Dunga Gali in the Nathiagali area of Ayubia National Park. Much of it the Mountain is covered with Western Himalayan sub-alpine conifer forests.

The Ayubia National Park is Home for Approximately 200 Species of Birds, 31 Species of Mammals, 16 Species of Reptiles, 3 Species of Amphibians, 23 Species of Butterflies, and 650

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19      Spatial Analysis of Vascular Flora of Ayubia National Park, KPK, Pakistan: a Classical Example of Moist Temperate Himalaya Rabia afza *et al*/

described Species of Insects (ANP Management Plan 2002). It also reportedly contains over 250 species of Flora.

“Aumeeruddy-Thomas et al. (2004) reported a Social Assessment Study on the Dependence of Local Communities on Ayubia National Park Conducted by WWF-Pakistan. This Study Focused on Activities and Impact of Communities on Park Resources such as Fodder and Fuel Wood Collection in Addition to the Fodder Production System in Village Suburbs. According to this Study, about 6,000 Households Comprising 42,000 People use Park Resources Mainly for Fodder and Fuel Wood Despite Complete Legal prohibition. In Addition to these, the Local People rear Livestock as a Major Means of Meeting Dairy Requirements. Therefore, Grazing of Livestock in the Park is also Common. Fodder and Fuel Wood Consumption are Regarded as the Major Causes of Deforestation in the Entire Area. The Local People consider the use of Natural Resources everywhere (including inside Parks) as their Right (as Reviewed in Box 1). Many Social Advocates contest Establishment of Protected Areas as they take away the Property and Rights of Local People (Wilkie et al. 2006).

According to Aumeeruddy-Thomas et al. (2004), the women usually bribe 50-200 rupees (\$1-4) to the protection staff in the park for each bundle of fuelwood and 100-400 rupees (\$2-8) for cutting down a small tree.

At higher altitude pastures such as Mukshpuri Top inside Ayubia National Park, oxen and buffaloes graze freely and are left unattended during summer time, which adversely affects regeneration of broad-leaved palatable species (Aumeeruddy-Thomas et al. 2004). Goats are not left grazing alone in the park for fear of leopards. Many researchers have reported that vulnerability of livestock to predation increases due to grazing in distant pastures (Jackson 1996, Mishra 1997, Sekhar 1998, McCarthy 2000, Wang and Macdonald 2006).

However, Aumeeruddy-Thomas et al. (2004) reported unrestricted grazing of cattle and goats outside the park in the reserved and guzara forests.”<sup>20</sup>

Further it is reported that:

“Forest Resources in Northeast Pakistan are under Severe Threat, Negatively Affecting Local People Aiming to Meet their Subsistence Needs through Different Types of Forest Use. In addition to uses such as Fodder and Fuelwood, Medicinal Plants Play an Important Role in the Livelihoods of **Local People**.

To reduce pressure and dependency on remaining old-growth forests, some deforested and degraded sites have been reforested.

Degradation of native old-growth forests and deforestation can have severe negative consequences for forest functions, such as conservation of biodiversity and provision of goods to rural communities.

People living in developing countries often struggle to meet their basic food, health, and fuelwood needs, to which these plantations may contribute. Pakistan is an example, where the majority of rural people living in mountainous regions depend heavily on forest products (Adnan et al 2006).

Forests around the ANP are being cut ruthlessly, the impact of which is visible in the form of more open guzara forests (Aumeeruddy et al 2004).

Moreover, the local community depends on non-timber forest products (NTFPs), mainly medicinal plants, which are also being overexploited (Aumeeruddy et al 2004). Such disturbances may

result in dwindling renewable natural resources, including medicinal plants (Southworth and Tucker 2001).”<sup>21</sup>

And Yet, In the very start of the recent Lockdown as an Excuse for Corona Virus Protection, including Islamabad and Abbottabad Districts, restricted to the Common people as Private vehicles are allowed to ply without let or hinderence, The so-called Elite are allowed to perform Violation Ceremonies to convert Nathiagalli into Thailand for illicit enjoyment of effete and corrupt Exploiters! No less than the Prime Minister of the Country opted for a High Rise, 5-Star Hotel to be constructed within the environs of a Protected Area, National Park. This is in blatant violation of the Rio Summit Declaration; CITES and The Convention on Biological Diversity (CBD). This agreement among the vast majority of the world's governments sets out commitments for maintaining the world's ecological underpinnings as we go about the business of economic development. The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. Bonn Convention The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or The Bonn Convention Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Program, concerned with the conservation of wildlife and habitats on a global scale.

The Authorities are trying to take advantage of the fact that Ayubia National Park is a Category V Protected Area.

The “IUCN definitions for the terms “Protected Areas” and “National Parks”. “A Protected Area is an Area of Land and/or Sea Especially Dedicated to the Protection and Maintenance of Biological Diversity, and of Natural and Associated Cultural Resources, and Managed through Legal or other Effective Means” (IUCN 1994:5). Any Area which is Specifically Managed or Protected for the Purposes of Biodiversity Conservation thus Falls into the Category of Protected Areas. A National Park is a Sub-Category of Protected Areas Managed Mainly for Ecosystem Protection and Recreation. Protected Areas, where Natural Processes and Population Dynamics may Occur with Minimal Modern Human Influence, Play a Vital Role in Conserving Wildlife Populations (Doak 1995, Noss et al. 1999).<sup>22</sup>

### **Ayubia IUCN Category V**

#### **Category V: Protected Landscape/Seascape.**

A protected area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

#### **Primary objective**

To protect and sustain important landscapes/seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices.

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21 Medicinal Plant Abundance in Degraded and Reforested Sites in Northwest Pakistan Muhammad Adnan and Dirk Holscher.

22 <https://www.iucn.org/theme/protected-areas/about/protected-area-categories>

## Other objectives

- To maintain a balanced interaction of nature and culture through the protection of landscape and/or seascape and associated traditional management approaches, societies, cultures and spiritual values;
- To contribute to broad-scale conservation by maintaining species associated with cultural landscapes and/or by providing conservation opportunities in heavily used landscapes;
- To provide opportunities for enjoyment, well-being and socio-economic activity through recreation and tourism;
- To provide natural products and environmental services;
- To provide a framework to underpin active involvement by the community in the management of valued landscapes or seascapes and the natural and cultural heritage that they contain;
- To encourage the conservation of agrobiodiversity and aquatic biodiversity;
- To act as models of sustainability so that lessons can be learnt for wider application.<sup>23</sup>

‘For IUCN, only those areas where the main objective is conserving nature can be considered protected areas; this can include many areas with other goals as well, at the same level, but in the case of conflict, nature conservation will be the priority’ (Dudley, 2008).’

**“Categories V and VI.** The second major debate related to whether Category V (protected landscapes/seascapes) and Category VI (protected areas with sustainable use of natural resources) are really protected areas at all and, if so, how they should be managed. In an influential article Locke & Dearden (2005) proposed that management in many of these areas paid so little attention to conservation that they should be removed from the WDPA. This would be highly significant as, for example, in Europe over half the area of protected areas is in Category V (Gambino, 2008). Locke & Dearden (2005) drew responses arguing that landscape approaches are the most effective conservation mechanism in some situations (e.g. Mallarach et al., 2008) and initiated a debate about the value of Categories V and VI. The WCPA asked task forces on both categories to help to determine how the new guidelines would influence interpretation of these approaches.”

A Landscape Approach is broadly defined as a framework to integrate policy and practice for multiple land uses, within a given area, to ensure equitable and sustainable use of land while strengthening measures to mitigate and adapt to climate change

This approach is primarily for reconciling Agriculture and Conservation for Poverty Eradication and Sustainable Development.

How a Multi Story Hotel, or two, for Tourists can fit into this Category is a Question worth putting to the Authorities who are Planning such Landscape Violation Interventions.

“There were also questions about the criteria for, and management of, these areas, particularly with respect to Category VI. In 1994 this was defined as an area that must be at least two-thirds completely natural (IUCN, 1994), with some kind of simple management (such as collection of non-timber forest products) in the remainder. However, practical application has never been as stringent as the guidelines suggested and during the review three very different proposals emerged: (1) keep the 1994 criteria of having two-thirds of the area completely natural; (2) remove or drastically reduce the requirement to have two-thirds of the area in a natural state while retaining the ban on industrial-scale activity (e.g. large-scale stock grazing or forestry); (3) open up the category dramatically to include sustainable large-scale logging and grazing (Dudley & Stolton, 2008).

23 <https://www.iucn.org/theme/protected-areas/about/protected-areas-categories/category-v-protected-landscapes seascape>



Many of the criticisms of Categories V and VI were addressed by the new definition, which in effect closes a loophole that previously allowed vague management designations to be listed as protected areas under these categories and ensures that all such areas should have clear conservation objectives. As a result all the categories were included in the guidelines without opposition and the importance of all the categories was the subject of a successful motion at the World Conservation Congress in Barcelona in October 2008.

## Conclusions

The existence of the protected area estate is a testament to the social value placed on its existence by many countries and societies. As with many other social values there is a continuing evolution of the ways in which protected areas are conceived and managed. The robustness of the concept is evident in the changes over the last 40 years. Discussions over the definitions and categories of protected areas since 2004 reflect differences in the ways that stakeholders view the role of protected areas as a conservation tool. The long process of negotiation shows that the conservation community can reach agreement on protected area policy. The process needs to continue as new questions arise, for example about categorization of protected areas in the oceans. It is important not to lose momentum and to promote and build capacity around the new categories and continue building on progress to date. It is clear that as values change, so too will the interpretations of protected areas. It is vital to maintain resilience politically, socially and biologically if protected areas are to perform their vital functions in a rapidly changing world.”<sup>24</sup>

## Principle 9: Resilience. (of 10 Principles for Management for Landscapes).

Wholesale unplanned system changes are usually detrimental and undesirable. System-level resilience can be increased through an active recognition of threats and vulnerabilities. Actions need to be promoted that address threats and that allow recovery after perturbation through improving capacity to resist and respond.<sup>25</sup>

Clearly, The Interventions Planned by the Galliyat Development Authority, under it’s Chairman, Mr. Ehsan Mani is in Total Conflict with this Principle.

Landscape approaches are primarily rooted in conservation and the science of landscape ecology.<sup>26</sup> <sup>27</sup> Biodiversity conservation in particular has been addressed in a “landscape context” since the early 1980s.<sup>28</sup> <sup>29</sup>

Landscape approaches attempt to achieve balance amongst multiple goals over long time periods and to adapt to changing conditions.

The landscape approach is recognized as a mechanism for achieving the Aichi targets of the UN Convention on Biological Diversity and is widely advocated in measures to achieve climate smart landscapes that mitigate and adapt to climate change (Reed et al. 2016; Harvey et al. 2014; Scherr et al. 2012).

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24 <https://www.cambridge.org/core/journals/oryx/article/revised-iucn-protected-area-management-categories-the-debate-and-ways-forward/38E5E1C1961A64471C85BC95F2FA5051>

25 <https://www.pnas.org/content/110/21/8349>

26 A checklist for ecological management of landscapes for conservation. *Ecol Lett* 2008, 11:78–91.

27 Sayer J: Reconciling conservation and development: are landscapes the answer? *Biotropica* 2009, 41:649–652. 10.1111/j.1744-7429.2009.00575.x

28 Noss RF: A regional landscape approach to maintain diversity. *Bioscience* 1983, 33:700–706. 10.2307/1309350

29 <https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/2047-2382-4-2>



It is recognized that conservation cannot be dissociated from socio-economic development (Milder et al. 2012, 2014; Frost et al. 2006). We define the landscape approach as “a long-term collaborative process bringing together diverse stakeholders aiming to achieve a balance between multiple and sometimes conflicting objectives in a landscape or seascape”. Landscape approaches are commonly proposed for situations where there is ambiguity or disagreement over desirable outcomes. The assumption behind landscape approaches is that by accounting for trade-offs and exploiting potential synergies, they will achieve a better balance between conflicting objectives compared with the conventional spatial planning or sectoral approaches (Goërg 2007).<sup>30</sup>

In principle, all forests should be managed sustainably, including management systems that entail leaving the forest untouched. According to a wide range of globally agreed principles (from the 1992 Earth Summit and its follow-ups, the International Labour Organisation, principles from indigenous peoples’ organisations etc), *all* forest management should be subject to environmental and social safeguards. The Forest Principles agreed in Rio state:

*“Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations” (United Nations, 1993).*

Governments and conservation organisations are scaling up their conservation efforts, in accordance with the requirements of the Convention on Biological Diversity (CBD) and its “Ecosystem Approach” and the commitments made regarding protected areas at the Seventh Conference of Parties in 2004 and the CBD *Programme of Work on Protected Areas*.

The widespread adoption of science based, landscape-level conservation planning, a more systematic approach to protected area planning is possible, including the use of a full range of protected area management categories.

**Category V: area managed mainly for landscape/seascape conservation or recreation** – area of land, with coast or sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area

#### **Conservation of Leopards:**<sup>31</sup>

Large carnivores are important for biodiversity and ecosystem function, yet are very difficult to conserve because of their large home ranges and conflicts with humans. Since 1989, 16 humans have either been killed or injured in and around Ayubia National Park while leopards faced 44 human-caused mortalities during the same period.

Wildlife Experts make the following recommendations to improve leopard management in and near Ayubia. First, to minimize human-leopard conflicts, educational and information programs to modify human behavior to reduce risks should be developed. Second, predator compensation programs and livestock vaccination programs would help reduce livestock conflicts.

Lastly, broader scale management changes such as enhanced protection of areas surrounding Ayubia National Park, re-introduction of extirpated native ungulates as prey for leopards, and improvements in monitoring could benefit leopard conservation.

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30 [https://www.iucn.org/sites/dev/files/content/documents/measuring\\_the\\_effectiveness\\_of\\_landscape\\_approaches-sayer\\_et\\_al.\\_2016.pdf](https://www.iucn.org/sites/dev/files/content/documents/measuring_the_effectiveness_of_landscape_approaches-sayer_et_al._2016.pdf)

31 Conservation of Leopards in Ayubia National Park, Pakistan. Asad Lodhi.

Large carnivores are integral parts of ecosystems because of their ecological roles through both direct and indirect interactions. For example, wolves (*Canis lupus*) may indirectly benefit plant populations through direct control of herbivore populations (Ripple et al. 2001). Ecologically, reduction in the top trophic level in the ecosystem may bring dramatic imbalance to the ecosystem (Miquelle et al. 2005). Because overabundant herbivore populations can have large impacts on plant species diversity, richness, and performance (Alverson et al. 1988, Rooney and Waller 2003, Rooney et al. 2003, Cote et al. 2004, Allombert et al. 2005), loss of top predators such as leopards (*Panthera pardus*) may have unpredictable effects on ecosystem dynamics.

Despite their important ecosystem role, carnivores are difficult to effectively conserve because they are wide ranging, requiring the protection of large wild areas (Gros et al. 1996). However, expansion of human populations and over-utilization of living natural resources have caused the extirpation of many species of large carnivores that require large home ranges and have low reproductive rates and densities.<sup>32</sup> Human tolerance for large carnivores can also be low. In some areas, large carnivores kill not only livestock but also jeopardize the lives of people living near them. The conflict between people and wildlife and particularly with large carnivores has recently been identified as a threat to wildlife and their habitats.<sup>33</sup>

Conflict between wildlife and humans is a major problem throughout the world.<sup>34</sup> Where human and large carnivore populations overlap, three types of conflicts are common: carnivores kill livestock and sometimes people; prey populations are depleted from over-exploitation by humans, leading to declines in carnivore populations; and human-caused mortality of carnivores.<sup>35</sup> Conflicts between humans and predators arise most often because of competition for shared, limited resources. The conflicts can be particularly controversial when the resources concerned have economic value and the predators involved are legally protected.<sup>36</sup> Poaching and habitat fragmentation through human developments have led to near extinction of the Far Eastern leopard (*Panthera pardus orientalis*) in the wild in Russia, China, and Korea.<sup>37</sup> Martins and Martins (2006) have also listed habitat loss, reduction in prey, and heavy persecution by farmers as key threats to leopard survival in the mountainous regions of the Western Cape in South Africa. Fragmentation and isolation of geographic ranges often result in restriction of wide-ranging movements of leopards and leading to conflicts with humans.<sup>38</sup> Mammalian carnivores are particularly vulnerable to local extirpation in fragmented landscapes because of increased direct contact with and persecution by humans.<sup>39</sup>

The large home ranges of felids relative to the size of protected areas often draw them into conflict with humans.<sup>40</sup>

To make matters more complex, an increase in predation on livestock often occurs following establishment of protected areas because carnivore populations are protected from persecution as

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32 Kenny et al. 1995, Noss et al. 1996, Purvis et al. 2000, Gittleman et al. 2001.

33 Gittleman et al. 2001.

34 Distefano 2005.

35 Johnson et al. 2006

36 Graham et al. 2005

37 Uphyrkina and O'Brien 2003

38 Fergus 1991, Mizutani 1999, Seidensticker et al. 1999

39 Noss et al. 1996, Woodroffe and Ginsberg 1998, Crooks 2002, Martins and Martins 2006

40 Michalski et al. 2006

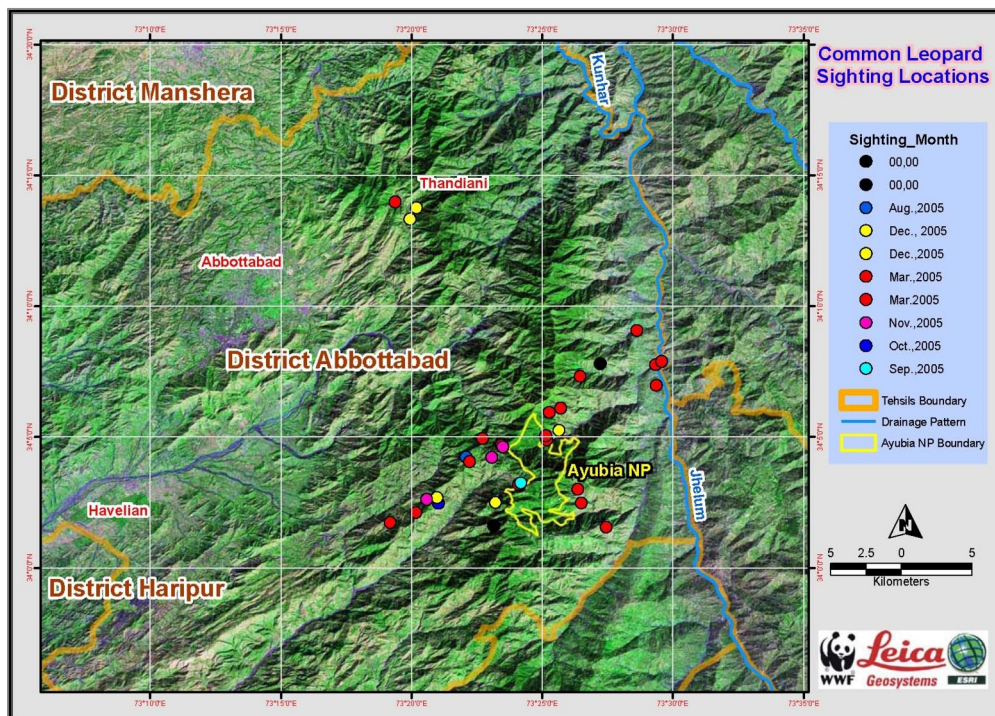
reported from India, Tibet, Nepal, Bhutan, and Mongolia.<sup>41</sup> The future of most protected areas hinges on the degree to which local people's concerns, needs, and aspirations are addressed by conservationists.<sup>42</sup> Border zones of protected areas may be population sinks where conflict with humans is the major cause of mortality.<sup>43</sup> However, even within protected areas, humans often kill carnivores because of conflicts with nearby human populations;<sup>44</sup> this is especially common when those protected areas are small.

Conservationists have been working in other parts of the world on many options to reduce leopard-human conflicts through compensation, proper zoning of habitats, and promotion of eco-tourism. In endangered species conservation, diagnosing the factors that affect population dynamics is imperative because recovery is dependent upon recognizing the conditions that caused a species to decline.<sup>45</sup>

The purpose of the Park is to conserve the unique flora and fauna of the moist temperate western Himalayan ecosystem. The leopard had become extremely rare by early 1980s and had reached the verge of extinction in Galiat and adjoining areas, however the establishment of this national park provided protection to leopards, in the Galiat, Has served to stop this trend.

The communities are dependent on resources of Park and Reserved Forests for fuel wood collection, livestock grazing, and timber.

The leopard has now been reported from all over Galiat from Turnawai forest in the north to Murree hills in the south and Margalla hills in the west.



41 Saberwal et al. 1994, Oli et al. 1994, Studsrod and Wegge 1995, Mishra 1997, McCarthy 2000, Maikhuri et al. 2001

42 Jackson et al. 1996, Wangchuk and Jackson 2001

43 Woodroffe and Ginsberg 1998, Distefano 2005

44 Kenny et al. 1995, Jackson et al. 1996, Kolowski and Holekamp 2006

45 Mills 2007

Ayubia National Park is likely too small in size to harbor large numbers of leopards because average home range sizes are equal to or larger than the size of the park. For example, Karanth and Sunquist (2000) found that home range sizes (measured using minimum convex polygons (MCP)) of leopards in Nagarhole, India, ranged from 17 to 26 square kilometers. Nearby in Nepal, Odden and Wegge (2005) found that leopard home ranges were approximately 48 square kilometers for male leopards and 17 square kilometers for females.

Odden and Wegge (2005) compared their home ranges to those of African leopards and concluded that south Asian home ranges were much smaller.

These studies emphasize that the size of Ayubia National Park at 33 square kilometers is likely too small to be home to a self contained population of leopards. Therefore, leopard conservation will also rely on areas surrounding Ayubia National Park.

In Ayubia National Park, the main prey of the leopard is the Rhesus macaque (*Macaca mulatta*) (Roberts 1977).

Blangy and Mehta (2006) found that local communities increasingly think of ecotourism as a prospective tool for promoting sustainable livelihoods. This study also found tourism increased by more than 100% between 1990 and 2000 in the world's biodiversity hotspots. The adverse effects of tourism result from park infrastructure and accommodation facilities (Blangy and Mehta 2006).

The Galliyat tract offers great recreational resources, attracting tourists from far and near especially on hot summer days. According to the local estimates, 90,000-100,000 people visit Ayubia National Park per year.<sup>46</sup>

Based on this, tourist facilities in surrounding areas in the form of vacation homes, hotels, and restaurants, in addition to the stores and shops, provide means of income generation for the local people who then put increased pressure on the forest resources for fuel wood. However, due to the large need for wood in the hotels and vacation homes, many of them buy wood or use propane. However, these more recent efforts to find alternative fuel sources are just starting, and extraction of wood for fuel from the park is a persistent problem.

The government, the affected local communities, and other stakeholders must come forward with a joint solution for the coexistence of humans and leopards. Media emphasized the importance of conducting awareness-raising programs, field studies, advocacy, and training of local people in avoiding leopard attacks at a large scale by government agencies to relieve the people and maintain a natural harmony with the wild animals.

Ayubia National Park is among the best preserved areas in terms of biodiversity and natural resource conservation in the western Himalayas.

However, wildlife conservation in the face of pressures from the surrounding communities for subsistence on the park resources offers a great challenge. The KP wildlife department has a mandate to manage this important protected area through enforcement of the KP Wildlife Act 1975 and rules. The following activities are prohibited in the National Park:

1. Hunting, shooting, trapping, killing, or capturing any wild animal in the National Park or within a three mile radius of its boundary.
2. Firing any gun or doing any other act which may disturb any animal or bird, or doing any act which interferes with nesting and denning sites.

3. Felling, lopping, burning, or in any way damaging or destroying any plant or tree in the Park.
4. Clearing or breaking up any land for cultivation, mining, or for any other purpose.
5. Polluting water.
6. Grazing by livestock.

For the general protection and management of Park, one Park Ranger, one deputy Ranger, and four Wildlife Watchers were employed inside the Park, all of whom report to the Divisional Forest Officer Wildlife, Abbottabad. The Wildlife Department implemented two projects to develop basic infrastructure and tourist facilities, namely, “Establishment of Ayubia National Park” and “Development of tourist facilities in Ayubia National Park” completed in 1988-89 and 1998-99, respectively. However, most of the facilities were completely destroyed due to heavy snowfall and snow slides in 2002-03 and 2004-05. In the 1990s, the concept of community participation in conservation opened new vistas for managing natural resources through donor-funded projects and community-based interventions designed to provide benefits to local communities and ensure sustainability. The European Union provided financial assistance for a 5-year project entitled Natural Resource Conservation Project (NRCP) in Galliat to reduce dependence of the local communities on park resources. The Project was completed in 2004.

NRCP was primarily executed by KP Forest Department which focused on reducing pressure on forest resources. For this purpose, nurseries of fast growing species were established on communal land for the people as a source of fuel wood. About 75 nurseries of fast growing species were established with preferred trees such as *Robinia*, *Ailanthus*, *Aesculus*, and *Populus* species.

Secondly, fuel efficient stoves were provided to the local people at subsidized rates to improve their heating and cooking methods. Special training was arranged for community members. About 200 such stoves were installed in different communities in the project area.

In an attempt to reduce collection of firewood from the park, NRCP also established 2 fuel wood depots at Nathiagali and Khanspur which provided firewood to the local villagers at subsidized rates. For this purpose, Terms of Partnerships were signed with villages to implement the activity. The wildlife sector also worked to enhance the capacity of tourist guides and community wildlife watchers.

Different conservation based activities were undertaken in various sectors (e.g. forestry, livestock, agriculture, wildlife, training, capacity building). The forestry sector was responsible for raising fast-growing species with subsidized seeds and planting bags. Plantations in open areas were also carried out to improve cover. Dams were developed in hilly areas to reduce soil erosion.

The livestock sector provided good breeds of poultry and cattle at subsidized rates. The exotic cattle species could be stall fed and give high quality dairy output. The agricultural sector provided subsidized seeds with technical support for raising different fruit species and for raising grass for livestock.

Educational programs have also been developed to aid wildlife conservation in the province. For example, the Wildlife Department established school Wildlife Clubs in the vicinity of the park to educate children regarding natural resource conservation. Plant nurseries were created in the schools to gain support of students and teachers in the cause of conservation. These few examples illustrate the potential for new education projects to be developed to aid wildlife conservation.

**Management Plan:**

The Government of KP prepared a Management Plan for Ayubia National Park under NRCP. However, the Plan could not be implemented because NRCP ended in 2004. To implement the activities envisaged in the management plan for the park, the Government of Pakistan began a 5-year project in 2004 implemented by the KP Wildlife Department. Activities outlined in the Ayubia National Park Management Plan include basic tourist and park infrastructure development, habitat management, fire fighting provisions, community participation, staff and community training, and awareness programs. However, the activities of various sectors of Natural Resource Conservation Project were not well coordinated and communities did not realize the basic aim behind all these incentives: mitigating pressures on forest resources. The communities simply considered the Project as a poverty-alleviation donor fund.

An Ethnobotany Project for the communities living around Ayubia National Park was started in 1997 through collaborative effort between WWF-Pakistan and the People and Plants joint program of UNESCO, WWF, and the Royal Botanical Gardens (KEW). This Project focused on activities related to estimation of dependence of local people on park resources like fodder and fuel wood, and fodder production system in homestead areas. This Ethnobotany Project also analyzed the social forestry approach and energy conservation efforts including fuel wood efficient stoves. Promotion of a new grass fodder variety as well as improved maize seedlings was undertaken as well as experimentation with the domestication of native medicinal plant species and exotic species. The Project recommended that grasses, mushrooms, and wild vegetables be collected in well-defined sites inside the Park. At the same time, free grazing and fuelwood collection would be discouraged in lieu of new guzara and grasslands, provision of seedlings for fodder and fuelwood, and ownership of tress by the communities (Aumeeruddy-Thomas et al. 2004).

According to some sources the designation Mukeshpuri is derived from the Sanskrit words: Moksha (liberation) and Puri (city). Mukeshpuri is of special paramount for the Hindus because of the Legends relating it to the Pandavas of the Mahabharata. There are the five Pandavas, the heroes of the Mahabharata, who are favorite objects of worship in the east and sometimes addressed as the Panj Pir (five Saints).

The route from Nathiagali on western side of mountain is a steady and 2.5 kilometers long climb and it will take about 2 hours. The mountain withal has a route on the Dunga Gali side, with a steeper slop. There is a bird sanctuary on this side engendered with the avail of the European Coalescence. The following areas can be viewed from the top of Mukeshpuri peak, Circle Bakote, Jhelum River, the Bagh District of AJK, in the south the city of Murree and the Murree Tehsil, as well as Islamabad, Pakistan.

As of 2016, the Lal Suhanra Biosphere Reserve and Ziarat Juniper Forest are the only two biosphere reserve in Pakistan, which were approved by UNESCO in 1977 and 2013 respectively. We Demand That Ayubia National Park, Nathiagalli, Pakistan be declared a Biosphere Reserve under UNESCO's Man and the Biosphere Programme (MAB) to promote sustainable development for conservation of biological and cultural diversity.

IUCN's advice is that national protected area agencies should first decide how a particular area should be managed, if necessary using their own national system of protected area types, and only then



assign each type to one of the IUCN categories. In that sense, the category system as devised in 1994 was intended to be more indicative rather than prescriptive.

A fundamental principle in the development and application of the categories system is that assignment is on the basis of management objective, including levels of protection, restrictions on use and so on. This means that candidate protected areas are assigned an IUCN category according to the purposes set out in legislation, management plans or other means. They are not determined according to the governance and management arrangements nor the ownership of land and water.

Nor is the assignment a statement of the effectiveness of the management of the protected area; nor indeed of the outcome of management. This rule applies to Forest Protected Areas just as much as to any other kind of protected area.

Nonetheless, there is a particular interest at present in the governance of protected areas as reflected in different management regimes. Thus Recommendation 17, adopted by a workshop at the Vth World Parks Congress (Durban, 2003), recognizes “at least four broad governance types applicable to all IUCN protected area categories”:

Government managed

Co-managed (i.e. multi-stakeholder management)

Privately managed

Community managed (community conserved areas)

More specifically in relation to the last governance type, Community Conserved Areas (CCAs), Recommendation 26 promotes “CCAs as a legitimate form of biodiversity conservation and, where communities so choose, they should be included within national systems of protected areas through appropriate changes in legal and policy regimes”. Where CCAs meet the IUCN definition of a protected area, they should indeed be so recognised and this fact entered in national and international data records of protected areas. This was reinforced by Resolution 3.018 of the Third World Conservation Congress, Bangkok, 2004

In the 2000 UN Temperate and Boreal Forest Resources Assessment, some countries classified *all* their forests as being Forest Protected Areas, as they believed that all managed forests fitted the definitions given in Categories V and VI. But in fact no country had all their forest “especially dedicated to the maintenance of biological diversity” (Anon, 2000). As a result, some governments favoured setting up a different system to the IUCN categories, and the Ministerial Conference on the Protection of Forests in Europe has drawn up its own *MCPFE Classification of Protected and Protective Forest Areas in Europe* (MCPFE, 2001 and 2003) – see Table 1.

**Table 1. Classification system being applied by the Ministerial Conference for the Protection of Forests in Europe and the UNECE/FAO**

MCPFE classes		Equivalent IUCN categories
1. Main management objective: “biodiversity”	1.1 No active intervention	Ia + Ib
	1.2 Minimum intervention	II
	1.3 Conservation through active management	IV
2. Main management objective: “protection of landscapes and specific natural elements”		III, V, VI
3. Main management objective: “protective functions”		n/a

Strict reserves (e.g. Category I or II) will sometimes exist inside less restrictive protected area categories (e.g. Category V or VI). To avoid the problem of counting the same area twice, where one category is nested within another, its area should be subtracted from the total area of the larger protected area and accounted for separately.

***Separating protected areas from other forms of non-harvest, community or privately managed forests.*** There is a potential confusion between forms of forest management that control or exclude some management actions, and protected areas as defined by IUCN. This confusion is particularly so in the case of protected areas in Categories V and VI, which are set up *inter alia* to help preserve traditional cultures and lifestyles and may include a variety of forest uses, whilst still being managed to maintain the natural and cultural values associated with biodiversity.

#### **Category V advice:**

“In most types of protected areas, “forests” mean the remaining natural areas under trees. There will be such natural forests (‘old growth’, ancient, pristine or virgin forests) in many Category V protected areas too, but other kinds of woodland and forests will also be commonplace. Examples are: woodlots, small plantations, community woodlands, hedges and copses, shelter belts, sacred groves and other people-protected woodlands, fragments of riverine or hilltop forests, tree cover maintained for soil conservation or watershed protection— and so forth. So in Category V protected areas, forests and trees play a complex role”.

“However, forestry and woodland policies for the protected area as a whole will need to be broken down to reflect the many different kinds of forests and woodlands which are often found within a Protected Landscape and the values ascribed to them by society. These might be listed under a number of headings, according to the main functions of the treed area and appropriate policies, for example: forests/woodlands managed as nature reserves (often called ‘micro reserves’ in Latin America), where nature protection will have priority; commercial forests/woodlands, which are primarily managed for renewable supplies of timber; recreational forest/woodlands, which are primarily managed for their recreational value for local people and visitors; community forests/woodlands, which are managed primarily to serve the needs of the local community for food, energy, and materials; forests/woodlands managed as reserves for the sustainable off-take of wild animals, and other non-timber products like honey; watershed forests/woodlands, which help to protect water supply (quality and quantity) for downstream communities (within or outside the protected area); small woodlands for use in the farming system, such as hedges and copses, for soil control measures or for sporting purposes; and other woodlands, such as ornamental plantations or arboreta”.

“The management of forests in Protected Landscapes could be assisted through the work of the Forest Stewardship Council (FSC). This is an international non-profit organization that supports environmentally appropriate, socially beneficial, and economically viable management of forests. The FSC’s international labelling scheme for forest products is a credible guarantee that the product comes from a well-managed forest. FSC also supports the development of national and local standards to encourage forest stewardship at the local level, backed up by guidelines for regional certification standards. Forests managed to FSC standards could be expected to make a contribution to Category V objectives”. (Phillips, 2002, even when the entire forest area concerned will not qualify as a protected area, there may be areas within it that do. Examples include protected areas established within community woodlands, and areas set aside for strict protection within commercial forest land, for

example as a prerequisite for forest certification through the Forest Stewardship Council (FSC): (usually at least 5 per cent of forest needs to be set aside under FSC rules). Such reserves meet the IUCN definitions, as long as they have prioritised and clearly articulated management objectives for biodiversity protection, adequate and long-term security, credible tenure and specific management objectives compatible with the IUCN definition.

### **The changing relationship between protected areas and the wider landscape**

Until the last years of the twentieth century, protected areas were generally regarded as places apart: areas that were ‘set aside’ for wildlife or scenic protection as the tide of development swept away natural habitats around them. A few of the world’s largest protected areas may indeed be in that category. However, increasing understanding about the limitations of the “island conservation” approach – including the risks of genetic isolation, vulnerability to risk and climate change, and the limitations on natural cycles of renewal and change – has led planners to look beyond the borders of parks and into the broader landscape. Initially the focus shifted to consideration of networks of protected areas, but even these were perceived as having their limitations and latterly attention has focused increasingly on the interaction of the whole landscape mosaic at a regional scale and its overall ability to sustain and if necessary rebuild biodiversity.

Protected areas are one important part – often the most important part – of regional conservation strategies. But in most cases they need to be backed up by other sympathetic forms of land use, grading from some sites that are virtually as valuable as fully protected areas as defined by IUCN to others, such as cities or areas of intensive production, where the biodiversity value is very low. Described below are some of the forest types that provide the most significant conservation benefits outside official Forest Protected Areas. Linking all these together into a coherent conservation landscape is a huge task. However, stakeholders in many countries are increasingly working together to maximise the full range of economic, social and environmental benefits, across the whole landscapes in which they live and work.

### **Defining the status of corridors and buffer zones associated with Forest Protected Areas**

Many forested areas form corridors between the protected areas to allow species to move between them, or buffer zones to provide an extra layer of protection for the biodiversity and other values that the latter contain. They can also sometimes act as “stepping stones”; that is more isolated areas of natural habitat that provide way stations for migrating or mobile species that have difficulty crossing large areas of inhospitable habitat. While corridors, stepping stones and buffer zones are integral parts of many protection strategies, they often have no official protected area status. Terms like “biological corridor”, “conservation corridor”, “ecological stepping stone” and “buffer zone” are descriptions of management practices or landscape functions and do not automatically confer protected area status. Conservation in such areas is often achieved through timelimited voluntary conservation agreements without permanent commitment. Indeed many of those who are prepared to support conservation efforts on such a voluntary basis would strongly resist protected area status for land or water that they control. Table 3 sets out on how to distinguish different “linking” elements in a protected area network, describes their purpose, and gives examples.

### **IUCN Category Ia Forest Protected Area: Wo Long Nature Reserve, Sichuan, China**

**Location and importance:** Wo Long Nature Reserve is one of China’s oldest “panda reserves”, established in 1975 and covering 200,000 hectares. It forms an important element in the Chinese

government plans for a large network of similar reserves in mountainous regions, which are the last stronghold of the giant panda and other rare species. Once spread over a large part of China, pandas have suffered from habitat loss and hunting so that only about 1100 individuals remain in the wild, confined to approximately 24 montane populations at the edge of the Himalayan plateau. The reserve contains three sub-populations, each of 35–50 individuals (Louks *et al.*, 2001).

***In situ* management:** Pandas are protected within the reserve, which also runs an important captive breeding programme. The breeding centre probably now has the greatest genetic diversity of any panda population, having 18 individuals from different populations. The government is supporting a 3km<sup>2</sup> acclimatisation area to help prepare pandas for their release into the wild.

**Reasons for classification as a Forest Protected Area in IUCN category Ia**

The reserve is predominantly forested with natural forest, which is not managed. Officially, 4000 hectares of the reserve is designated as cropland (i.e. 2 per cent of the total) and 950 families are resident in small areas, mainly from the Tibetan and Qiang communities. Apart from a small area at the edge of the reserve and the captive breeding centre, the protected area is off limits for tourists. The only access to most of the area is for scientific research (for example the periodic survey of wild giant panda populations). The reserve is also large, supporting several distinct populations. It should be noted that although the above is the management intention, illegal degradation of Wo Long continues to cause concern and has resulted in further loss of panda habitat within the reserve. Current failure to meet all the aims of the protected area does not change its designation which is based on management aims.

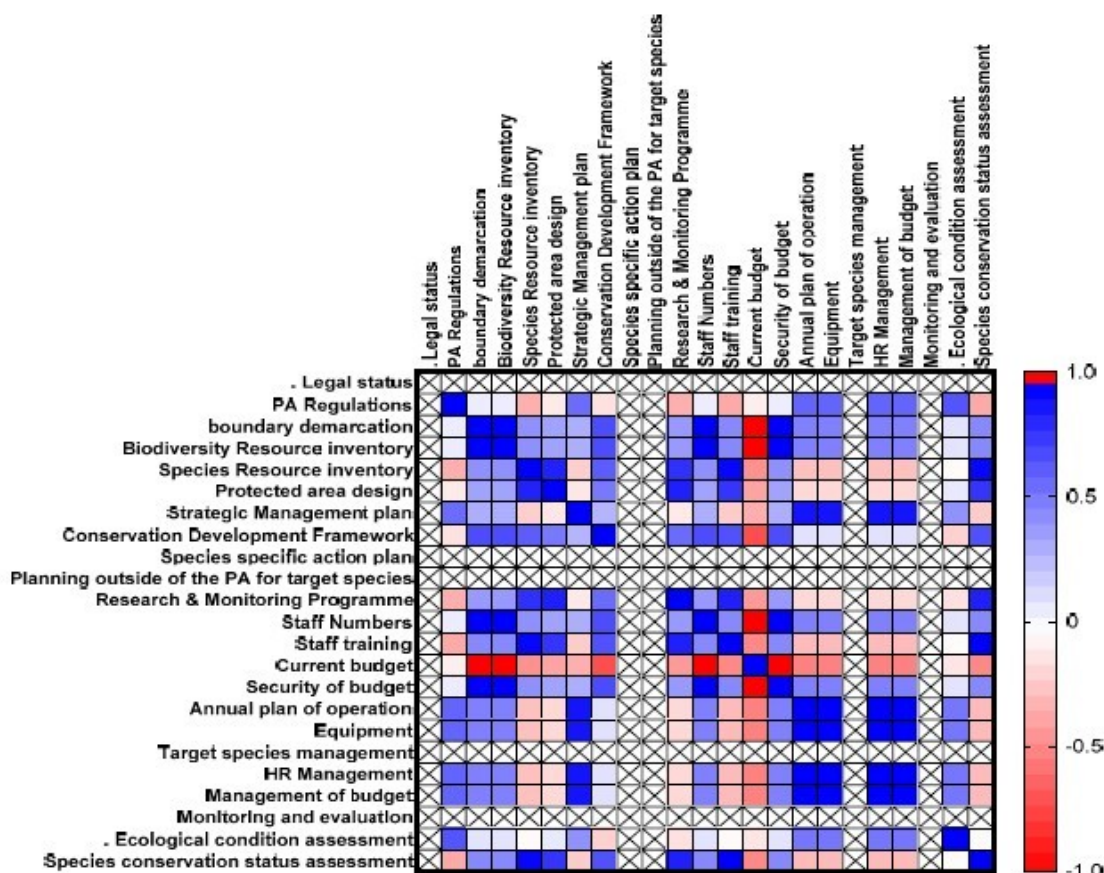
*Forests and Protected Areas: Guidance on the use of the IUCN protected area management categories*

**Reasons for classification as a Forest Protected Area in IUCN category Ib:**

The concept of “Wilderness Area” is precisely defined in US law. The area is predominantly forested and is managed as a wilderness area primarily for biodiversity and also some adventure tourism.

***In situ* management:** The Dana protected area is managed through cooperation with local communities, including particularly Dana village. Projects have helped to develop ecotourism, including production of a range of organic herbs and locally made products for sale to visitors. Both guest house and campsite facilities are available. A key aspect of the management agreement is reduction in the number of goats grazing in Dana, which has resulted in important woodland regeneration throughout much of the area.

Montreal Process and the Ministerial Conference on Protection of Forests in Europe, which have set criteria and indicators of sustainable management.



### Management Effectiveness Tracking Tool Reporting Progress at Protected Area Sites:

There is a growing concern amongst protected area professionals that many protected areas around the world are not achieving the objectives for which they were established. One response to this concern has been an emphasis on the need to increase the effectiveness of protected area management, and to help this process a number of assessment tools have been developed to assess management practices. It is clear that the existence of a wide range of situations and needs require different methods of assessment. The World Commission on Protected Areas (WCPA) has therefore developed a ‘framework’ for assessment<sup>47</sup>. The WCPA Framework aims to provide overall guidance in the development of assessment systems and to encourage standards for assessment and reporting.

The WCPA Framework is based on the idea that good protected area management follows a process that has six distinct stages, or elements: it begins with understanding the **context** of existing values and threats, progresses through **planning**, and allocation of resources (**inputs**), and as a result of management actions (**processes**), eventually produces products and services (**outputs**), that result in impacts or **outcomes**.

The Management Effectiveness Tracking Tool is one of a series of management effectiveness assessment tools built around the WCPA Framework, which range from the *WWF Rapid Assessment and Prioritization Methodology* used to identify key protected areas at threat within a protected area

47 Hockings, M, S Stolton, F Leverington, N Dudley and J Courrau (2006); *Assessing Effectiveness – A Framework for Assessing Management Effectiveness of Protected Areas*; 2nd Ed. IUCN, Switzerland, [www.iucn.org/themes/wcpa/pubs/guidelines.htm#effect2](http://www.iucn.org/themes/wcpa/pubs/guidelines.htm#effect2)

system to detailed monitoring systems such as that developed by the *Enhancing our Heritage* project for UNESCO natural World Heritage sites.

Having this range of tools in place will aid the many countries who are signatories to the Convention on Biological Diversity (CBD) in fulfilling their commitments. In particular at the 7<sup>th</sup> CBD Conference of the Parties in 2004, 188 member countries agreed a *Programme of Work on Protected Areas*<sup>48</sup>, one of the most ambitious environmental strategies in history. As part of the programme Nations have committed to develop assessment systems and report on the effectiveness of 30 per cent of their protected areas by 2010.<sup>49</sup>

Table 1: Summary of the WCPA Framework

Elements of evaluation	Explanation	Criteria that are assessed	Focus of evaluation
Context	<i>Where are we now?</i> Assessment of importance, threats and policy environment	<ul style="list-style-type: none"> <li>- Significance</li> <li>- Threats</li> <li>- Vulnerability</li> <li>- National context</li> <li>- Partners</li> </ul>	Status
Planning	<i>Where do we want to be?</i> Assessment of protected area design and planning	<ul style="list-style-type: none"> <li>- Protected area legislation and policy</li> <li>- Protected area system design</li> <li>- Reserve design</li> <li>- Management planning</li> </ul>	Appropriateness
Inputs	<i>What do we need?</i> Assessment of resources needed to carry out management	<ul style="list-style-type: none"> <li>- Resourcing of agency</li> <li>- Resourcing of site</li> </ul>	Resources
Processes	<i>How do we go about it?</i> Assessment of the way in which management is conducted	<ul style="list-style-type: none"> <li>- Suitability of management processes</li> </ul>	Efficiency and appropriateness
Outputs	<i>What were the results?</i> Assessment of the implementation of management programmes and actions; delivery of products and services	<ul style="list-style-type: none"> <li>- Results of management actions</li> <li>- Services and products</li> </ul>	Effectiveness
Outcomes	<i>What did we achieve?</i> Assessment of the outcomes and the extent to which they achieved objectives	<ul style="list-style-type: none"> <li>- Impacts: effects of management in relation to objectives</li> </ul>	Effectiveness and appropriateness

## Purpose of the Management Effectiveness Tracking Tool

The Management Effectiveness Tracking Tool (METT or Tracking Tool) has been developed to help track and monitor progress in the achievement of the World Bank/WWF Alliance worldwide protected area management effectiveness target. It is also hoped that the Tracking Tool will be used more generally where it can help monitor progress towards improving management effectiveness; for example it is now obligatory for all Global Environment Facility protected area projects to use the Tracking Tool three times during the projects lifespan and the tool has been modified for use in several national protected area systems. In addition, use of the Tracking Tool can help managers track progress in implementing protected areas commitments under the Convention on Biological Diversity and the Ramsar Convention on Wetlands.

The original purposes of the Tracking Tool were that it needed to be:

- ☐ Capable of providing a harmonized reporting system for forest protected area assessment within both the World Bank and WWF.

<sup>48</sup> Decision VII/28 of the seventh meeting of the Conference of the Parties to the Convention on Biological Diversity, [www.biodiv.org/decisions/default.asp?m=COP07&id=7765&lg=0](http://www.biodiv.org/decisions/default.asp?m=COP07&id=7765&lg=0)

<sup>49</sup> Dudley, N, K J Mulongoy, S Stolton, S Cohen, C V Barber and S B Gidda (2005); *Towards Effective Protected Area Systems: An action guide to implement the Convention on Biological Diversity*



- ☐ Suitable for replication.
- ☐ Able to supply consistent data to allow tracking of progress over time.
- ☐ Relatively quick and easy to complete by protected area staff, so as not to be reliant on high levels of funding or other resources.
- ☐ Capable of providing a “score” if required.
- ☐ Based around a system that provides four alternative text answers to each question, strengthening the scoring system.
- ☐ Easily understood by non-specialists.
- ☐ Nested within existing reporting systems to avoid duplication of effort.

This version has been revised, and the original purposes expanded, to allow the Tracking Tool be more readily applied to all terrestrial protected areas through, in particular, more reference to wetland protected areas. (Note: a variation of the Tracking Tool has also been developed by the World Bank for use in Marine Protected Areas).<sup>50</sup>

### **Aims of the Management Effectiveness Tracking Tool**

The Tracking Tool aims to *report progress* on management effectiveness and should not replace more thorough methods of assessment for the purposes of adaptive management. The Tracking Tool has been developed to provide a quick overview of progress in improving the effectiveness of management in individual protected areas, to be filled in by the protected area manager or other relevant site staff. As such it is clear that there are limitations on what it can achieve: it should not for example be regarded as an independent assessment, or as the sole basis for adaptive management. Because of the great differences between expectations, resources and needs around the world, the Tracking Tool also has strict limitations in terms of allowing comparison between sites: the scoring system, if applied at all, will be most useful for tracking progress over time in one site or a closely related group of sites. The Tracking Tool has however been used to identify trends and patterns in management of protected areas across a number of sites.<sup>51</sup>

Lastly, the Tracking Tool is too limited to allow a detailed evaluation of *outcomes* and is really aimed at providing a quick overview of the management steps identified in the WCPA Framework up to and including *outputs*. Clearly, however good management is, if biodiversity continues to decline, the protected area objectives are not being met. Therefore the questions on condition assessment have disproportionate importance in the overall Tracking Tool.

### **Guidance Notes for using the Tracking Tool**

The METT has been designed to be a simple and rapid site assessment system. We recognize that there will be some variation in the way that it is completed depending on the circumstances and time available for any particular assessment; however the tool is beginning to provide a useful dataset on protected areas globally and thus we would encourage people to add additional questions to suit local circumstances rather than modify the Tracking Tool.

The following guidance on process should assist in making an assessment of Management Effectiveness as rigorous, reliable and useful as possible. National or regionally specific guidance can be prepared to provide more context for the completion of the Tracking Tool across a protected network

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50 World Bank (2004); *Score Card to Assess Progress in Achieving Management Effectiveness Goals for Marine Protected Areas*, Adapted by F Staub and M E Hatziolos, World Bank, Washington DC.

51 Dudley, N, A Belokurov, O Borodin, L Higgins-Zogib, M Hockings, L Lacerda and S Stolton (2004); *Are protected areas working? An analysis of forest protected areas by WWF*, WWF International, Gland.

or system. More general guidance on undertaking management effectiveness assessments can be found in the WCPA Framework.<sup>52</sup>

### Process for completing the Tracking Tool

The Tracking Tool contains a set of questions that have been designed to be easily answered by those managing the protected area without any additional research. However, it is useful to review the results of existing monitoring and to spend sufficient time discussing each aspect of management being assessed to arrive at a considered judgment. In most cases, a group of protected area staff from the reserve, project staff or other agency staff should be involved in answering the questions in the Tracking Tool; where possible additional external experts local community leaders or others with knowledge and interest in the area and its management should also be involved.

When repeat assessments are undertaken it is advisable to use at least some of the same team members who undertook previous assessments. Where this is not possible the information provided by previous assessors in the text fields of the Tracking Tool will be particularly valuable in guiding the assessment and ensuring consistency in the evaluation being made.

### Structure and content of the Tracking Tool

The Tracking Tool has two main sections: data sheets and assessment form. Both sections should be completed.

1. **Datasheets:** the data sheet comprises of two separate sections:

☐ Data sheet 1: records details of the assessment and some basic information about the site, such as name, size and location etc. Where possible the unique site code given to the protected area in the World Database on Protected Area (WDPA) should also be provided. The WDPA can be accessed via the UNEP-World Conservation Monitoring Centre website at: [www.unep-wcmc.org/wdpa](http://www.unep-wcmc.org/wdpa). Other contextual information such as local designation, i.e. national park, national reserve etc, along with the IUCN protected area management category,<sup>53</sup> ownership, staff numbers and budget are also recorded on this first sheet plus information on who was involved in the assessment. A second sheet records information on international designations:

i.e. UNESCO World Heritage, Man and Biosphere sites and Ramsar wetland sites.

☐ Data sheet 2: provides a generic list of threats which protected areas can face. On this data sheet the assessors are asked to identify threats and rank their impact on the protected area.<sup>54</sup>

2. **Assessment Form:** the assessment is structured around 30 questions presented in table format which includes three columns for recording details of the assessment, **all of which should be completed.**

☐ *Questions and scores:* the assessment is made by **assigning a simple score ranging between 0 (poor) to 3 (excellent)**. A series of four alternative answers are provided against each question to help assessors to make judgments as to the level of score given. In addition, there are supplementary questions which elaborate on key themes in the previous questions and provide additional information and points.

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52 Hockings, M, S Stolton, F Leverington, N Dudley and J Courrau (2006); *Assessing Effectiveness – A Framework for Assessing Management Effectiveness of Protected Areas*; 2nd Ed. IUCN, Switzerland.

53 IUCN, CNPPA and WCMC (1994); *Guidelines for Protected Area Management Categories*, Gland, Switzerland, [www.iucn.org/themes/wcpa/pubs/guidelines.htm#categories](http://www.iucn.org/themes/wcpa/pubs/guidelines.htm#categories)

54 The list of threats has been adapted from the Conservation Measures Partnership Taxonomy of Direct Threats (see <http://fosonline.org/CMP/IUCN/browse.cfm?TaxID=DirectThreats>) and uses the same numbering system.

This is, inevitably, an approximate process and there will be situations in which none of the four alternative answers appear to fit conditions in the protected area very precisely. We suggest that you choose the answer that is nearest and use the comment/explanation section to elaborate. ***Questions that are not relevant to a particular protected area should be omitted***, with a reason given in the comment/explanation section (for example questions about use and visitors will not be relevant to a protected area managed according to the IUCN protected area management Category Ia).

The maximum score of the 30 questions and supplementary questions is 99. A final total of the score from completing the assessment form can be ***calculated as a percentage of 99 or of the total score from those questions that were relevant to a particular protected area***. (As noted above if questions are believed to be irrelevant, this should be noted in the comment/explanation column). Thus if a protected area scores 65 out of a maximum score of 87 the percentage can be calculated by dividing 65 by 87 and multiplying by 100 (i.e.  $65 \div 87 \times 100 = 75\%$ ).

The whole concept of “scoring” progress is however fraught with difficulties and possibilities for distortion. The current system assumes, for example, that all the questions cover issues of equal weight, whereas this is not necessarily the case.

Scores will therefore provide a better assessment of effectiveness if calculated as a percentage for each of the six elements of the WCPA Framework (i.e. context, planning, inputs, process, outputs and assessments).

☐ ***Comment/explanation:*** a box next to each question allows for ***qualitative judgments to be explained*** in more detail. This could range from local staff knowledge (in many cases, staff knowledge will be the most informed and reliable source of knowledge), a reference document, monitoring results or external studies and assessments – the point being to give anyone reading the report an idea of why the assessment was made.

It is **very important** that this box be completed – it can provide greater confidence in the results of the assessment by making the basis of decision-making more transparent. More importantly, it provides a reference point and information for local staff in the future. This column also allows for ***comments***, such as why a particular question was not answered, to be included when completing the questionnaire.

☐ ***Next Steps:*** for each question respondents are also asked to identify any intended actions that will improve management performance.

## Reporting Progress at Protected Area Sites: Data Sheet 1

Name, affiliation and contact details for person responsible for completing the METT (email etc.)										
Date assessment carried out										
Name of protected area										
WDPA site code (these codes can be found on <a href="http://www.unep-wcmc.org/hedpai">www.unep-wcmc.org/hedpai</a> )										
Designations		National			IUCN Category			International (please also complete sheet overleaf)		
Country										
Location of protected area (province and if possible map reference)										
Date of establishment										
Ownership details (please tick)		State		Private		Community		Other		
Management Authority										
Size of protected area (ha)										
Number of staff		Permanent				Temporary				
Annual budget (US\$) – excluding staff salary costs		Recurrent (operational) funds				Project or other supplementary funds				
What are the main values for which the area is designated										
List the two primary protected area management objectives										
Management objective 1										
Management objective 2										
No. of people involved in completing assessment										
Including (tick boxes)	PA manager <input type="checkbox"/>	PA staff <input type="checkbox"/>	Other PA agency staff <input type="checkbox"/>	NGO <input type="checkbox"/>						
	Local community <input type="checkbox"/>	Donors <input type="checkbox"/>	External experts <input type="checkbox"/>	Other <input type="checkbox"/>						
Please note if assessment was carried out in association with a particular project, on behalf of an organisation or donor.										

[illegible]

## 7. Natural system modifications

Threats from other actions that convert or degrade habitat or change the way the ecosystem functions

High	Medium	Low	N/A
			7.1 Fire and fire suppression (including arson)
			7.2 Dams, hydrological modification and water management/use
			7.3a Increased fragmentation within protected area
			7.3b Isolation from other natural habitat (e.g. deforestation, dams without effective aquatic wildlife passage)
			7.3c Other edge effects on park values
			7.3d Loss of keystone species (e.g. top predators, pollinators etc)

## 8. Invasive and other problematic species and genes

Threats from terrestrial and aquatic non-native and native plants, animals, pathogens/microbes or genetic materials that have or are predicted to have harmful effects on biodiversity following introduction, spread and/or increase

High	Medium	Low	N/A
			8.1 Invasive non-native/alien plants (weeds)
			8.1a Invasive non-native/alien animals
			8.1b Pathogens (non-native or native but creating new/increased problems)
			8.2 Introduced genetic material (e.g. genetically modified organisms)

## 9. Pollution entering or generated within protected area

Threats from introduction of exotic and/or excess materials or energy from point and non-point sources

High	Medium	Low	N/A
			9.1 Household sewage and urban waste water
			9.1a Sewage and waste water from protected area facilities (e.g. toilets, hotels etc)
			9.2 Industrial, mining and military effluents and discharges (e.g. poor water quality discharge from dams, e.g. unnatural temperatures, de-oxygenated, other pollution)
			9.3 Agricultural and forestry effluents (e.g. excess fertilizers or pesticides)
			9.4 Garbage and solid waste
			9.5 Air-borne pollutants
			9.6 Excess energy (e.g. heat pollution, lights etc)

## 10. Geological events

Geological events may be part of natural disturbance regimes in many ecosystems. But they can be a threat if a species or habitat is damaged and has lost its resilience and is vulnerable to disturbance. Management capacity to respond to some of these changes may be limited.

High	Medium	Low	N/A
			10.1 Volcanoes
			10.2 Earthquakes/Tsunamis
			10.3 Avalanches/Landslides
			10.4 Erosion and siltation/ deposition (e.g. shoreline or riverbed changes)

## 11. Climate change and severe weather

Threats from long-term climatic changes which may be linked to global warming and other severe climate/weather events outside of the natural range of variation

High	Medium	Low	N/A
			11.1 Habitat shifting and alteration
			11.2 Droughts
			11.3 Temperature extremes
			11.4 Storms and flooding

## 12. Specific cultural and social threats

High	Medium	Low	N/A
			12.1 Loss of cultural links, traditional knowledge and/or management practices
			12.2 Natural deterioration of important cultural site values
			12.3 Destruction of cultural heritage buildings, gardens, sites etc

## Protected Areas Threats: Data Sheet 2

Please tick all relevant existing threats as either of high, medium or low significance. Threats ranked as of high significance are those which are seriously degrading values; medium are those threats having some negative impact and those characterised as low are threats which are present but not seriously impacting values or N/A where the threat is not present or not applicable in the protected area.

### 1. Residential and commercial development within a protected area

Threats from human settlements or other non-agricultural land uses with a substantial footprint

High	Medium	Low	N/A
			1.1 Housing and settlement
			1.2 Commercial and industrial areas
			1.3 Tourism and recreation infrastructure

### 2. Agriculture and aquaculture within a protected area

Threats from farming and grazing as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture

High	Medium	Low	N/A
			2.1 Annual and perennial non-timber crop cultivation
			2.1a Drug cultivation
			2.2 Wood and pulp plantations
			2.3 Livestock farming and grazing
			2.4 Marine and freshwater aquaculture

### 3. Energy production and mining within a protected area

Threats from production of non-biological resources

High	Medium	Low	N/A
			3.1 Oil and gas drilling
			3.2 Mining and quarrying
			3.3 Energy generation, including from hydropower dams

### 4. Transportation and service corridors within a protected area

Threats from long narrow transport corridors and the vehicles that use them including associated wildlife mortality

High	Medium	Low	N/A
			4.1 Roads and railroads (include road-killed animals)
			4.2 Utility and service lines (e.g. electricity cables, telephone lines, etc)
			4.3 Shipping lanes and canals
			4.4 Flight paths

### 5. Biological resource use and harm within a protected area

Threats from consumptive use of "wild" biological resources including both deliberate and unintentional harvesting effects; also persecution or control of specific species (note this includes hunting and killing of animals)

High	Medium	Low	N/A
			5.1 Hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/wildlife conflict)
			5.2 Gathering terrestrial plants or plant products (non-timber)
			5.3 Logging and wood harvesting
			5.4 Fishing, killing and harvesting aquatic resources

### 6. Human intrusions and disturbance within a protected area

Threats from human activities that alter, destroy or disturb habitats and species associated with non-consumptive uses of biological resources

High	Medium	Low	N/A
			6.1 Recreational activities and tourism
			6.2 War, civil unrest and military exercises
			6.3 Research, education and other work-related activities in protected areas
			6.4 Activities of protected area managers (e.g. construction or vehicle use, artificial watering points and dams)
			6.5 Deliberate vandalism, destructive activities or threats to protected area staff and visitors

Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
4. Protected area objectives  Is management undertaken according to agreed objectives? Planning	No firm objectives have been agreed for the protected area	0			
	The protected area has agreed objectives, but is not managed according to these objectives	1			
	The protected area has agreed objectives, but is only partially managed according to these objectives	2			
	The protected area has agreed objectives and is managed to meet these objectives	3			
5. Protected area design  Is the protected area the right size and shape to protect species, habitats, ecological processes and water catchments of key conservation concern? Planning	Inadequacies in protected area design mean achieving the major objectives of the protected area is very difficult	0			
	Inadequacies in protected area design mean that achievement of major objectives is difficult but some mitigating actions are being taken (e.g. agreements with adjacent land owners for wildlife corridors or introduction of appropriate catchment management)	1			
	Protected area design is not significantly constraining achievement of objectives, but could be improved (e.g. with respect to larger scale ecological processes)	2			
	Protected area design helps achievement of objectives; it is appropriate for species and habitat conservation, and maintains ecological processes such as surface and groundwater flow at a catchment scale, natural disturbance patterns etc	3			
6. Protected area boundary demarcation  Is the boundary known and demarcated? Process	The boundary of the protected area is not known by the management authority or local residents/neighbouring land users	0			
	The boundary of the protected area is known by the management authority but is not known by local residents/neighbouring land users	1			
	The boundary of the protected area is known by both the management authority and local residents/neighbouring land users but is not appropriately demarcated	2			
	The boundary of the protected area is known by the management authority and local residents/neighbouring land users and is appropriately demarcated	3			

Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
7. Management plan  Is there a management plan and is it being implemented? Planning Additional points: Planning	There is no management plan for the protected area	0			
	A management plan is being prepared or has been prepared but is not being implemented	1			
	A management plan exists but it is only being partially implemented because of funding constraints or other problems	2			
	A management plan exists and is being implemented	3			
7a. Planning process	The planning process allows adequate opportunity for key stakeholders to influence the management plan	+1			
7b. Planning process	There is an established schedule and process for periodic review and updating of the management plan	+1			
7c. Planning process	The results of monitoring, research and evaluation are routinely incorporated into planning	+1			
8. Regular work plan  Is there a regular work plan and is it being implemented? Planning/Outputs	No regular work plan exists	0			
	A regular work plan exists but few of the activities are implemented	1			
	A regular work plan exists and many activities are implemented	2			
	A regular work plan exists and all activities are implemented	3			
9. Resource inventory  Do you have enough information to manage the area? Input	There is little or no information available on the critical habitats, species and cultural values of the protected area	0			
	Information on the critical habitats, species, ecological processes and cultural values of the protected area is not sufficient to support planning and decision making	1			
	Information on the critical habitats, species, ecological processes and cultural values of the protected area is sufficient for most key areas of planning and decision making	2			
	Information on the critical habitats, species, ecological processes and cultural values of the protected area is sufficient to support all areas of planning and decision making	3			

Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
10. Protection systems  Are systems in place to control access/resource use in the protected area? Process/Outcome	Protection systems (patrols, permits etc) do not exist or are not effective in controlling access/resource use	0			
	Protection systems are only partially effective in controlling access/resource use	1			
	Protection systems are moderately effective in controlling access/resource use	2			
	Protection systems are largely or wholly effective in controlling access/resource use	3			
11. Research  Is there a programme of management-orientated survey and research work? Process	There is no survey or research work taking place in the protected area	0			
	There is a small amount of survey and research work but it is not directed towards the needs of protected area management	1			
	There is considerable survey and research work but it is not directed towards the needs of protected area management	2			
	There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3			
12. Resource management  Is active resource management being undertaken? Process	Active resource management is not being undertaken	0			
	Very few of the requirements for active management of critical habitats, species, ecological processes and cultural values are being implemented	1			
	Many of the requirements for active management of critical habitats, species, ecological processes and cultural values are being implemented but some key issues are not being addressed	2			
	Requirements for active management of critical habitats, species, ecological processes and cultural values are being substantially or fully implemented	3			
13. Staff numbers  Are there enough people employed to manage the protected area? Inputs	There are no staff	0			
	Staff numbers are inadequate for critical management activities	1			
	Staff numbers are below optimum level for critical management activities	2			
	Staff numbers are adequate for the management needs of the protected area	3			



Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
14. Staff training  Are staff adequately trained to fulfil management objectives?  Inputs/Process	Staff lack the skills needed for protected area management	0			
	Staff training and skills are low relative to the needs of the protected area	1			
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2			
	Staff training and skills are aligned with the management needs of the protected area	3			
15. Current budget  Is the current budget sufficient?  Inputs	There is no budget for management of the protected area	0			
	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1			
	The available budget is acceptable but could be further improved to fully achieve effective management	2			
	The available budget is sufficient and meets the full management needs of the protected area	3			
16. Security of budget  Is the budget secure?  Inputs	There is no secure budget for the protected area and management is wholly reliant on outside or highly variable funding	0			
	There is very little secure budget and the protected area could not function adequately without outside funding	1			
	There is a reasonably secure core budget for regular operation of the protected area but many innovations and initiatives are reliant on outside funding	2			
	There is a secure budget for the protected area and its management needs	3			
17. Management of budget  Is the budget managed to meet critical management needs?  Process	Budget management is very poor and significantly undermines effectiveness (e.g. late release of budget in financial year)	0			
	Budget management is poor and constrains effectiveness	1			
	Budget management is adequate but could be improved	2			
	Budget management is excellent and meets management needs	3			

Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
18. Equipment  Is equipment sufficient for management needs?  Input	There are little or no equipment and facilities for management needs	0			
	There are some equipment and facilities but these are inadequate for most management needs	1			
	There are equipment and facilities, but still some gaps that constrain management	2			
	There are adequate equipment and facilities	3			
19. Maintenance of equipment  Is equipment adequately maintained?  Process	There is little or no maintenance of equipment and facilities	0			
	There is some ad hoc maintenance of equipment and facilities	1			
	There is basic maintenance of equipment and facilities	2			
	Equipment and facilities are well maintained	3			
20. Education and awareness  Is there a planned education programme linked to the objectives and needs?  Process	There is no education and awareness programme	0			
	There is a limited and ad hoc education and awareness programme	1			
	There is an education and awareness programme but it only partly meets needs and could be improved	2			
	There is an appropriate and fully implemented education and awareness programme	3			
21. Planning for land and water use  Does land and water use planning recognise the protected area and aid the achievement of objectives? Planning	Adjacent land and water use planning does not take into account the needs of the protected area and activities/policies are detrimental to the survival of the area	0			
	Adjacent land and water use planning does not take into account the long term needs of the protected area, but activities are not detrimental to the area	1			
	Adjacent land and water use planning partially takes into account the long term needs of the protected area	2			
	Adjacent land and water use planning fully takes into account the long term needs of the protected area	3			

Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
Additional points: Land and water planning					
21a. Land and water planning for habitat conservation	Planning and management in the catchment or landscape containing the protected area incorporates provision for adequate environmental conditions (e.g. volume, quality and timing of water flow, air pollution levels etc) to sustain relevant habitats.	+1			
	21b. Land and water planning for connectivity	Management of corridors linking the protected area provides for wildlife passage to key habitats outside the protected area (e.g. to allow migratory fish to travel between freshwater spawning sites and the sea, or to allow animal migration).	+1		
21c. Land and water planning for ecosystem services & species conservation	Planning addresses ecosystem-specific needs and/or the needs of particular species of concern at an ecosystem scale (e.g. volume, quality and timing of freshwater flow to sustain particular species, fire management to maintain savannah habitats etc.)	+1			
22. State and commercial neighbours  Is there co-operation with adjacent land and water users? Process	There is no contact between managers and neighbouring official or corporate land and water users	0			
	There is contact between managers and neighbouring official or corporate land and water users but little or no co-operation	1			
	There is contact between managers and neighbouring official or corporate land and water users, but only some co-operation	2			
	There is regular contact between managers and neighbouring official or corporate land and water users, and substantial co-operation on management	3			
23. Indigenous people  Do indigenous and traditional peoples resident or regularly using the protected area have input to management decisions? Process	Indigenous and traditional peoples have no input into decisions relating to the management of the protected area	0			
	Indigenous and traditional peoples have some input into discussions relating to management but no direct role in management	1			
	Indigenous and traditional peoples directly contribute to some relevant decisions relating to management but their involvement could be improved	2			
	Indigenous and traditional peoples directly participate in all relevant decisions relating to management, e.g. co-management	3			

Issue	Criteria	Score: Tick only one box per question	Comment/Explanation	Next steps
24. Local communities  Do local communities resident or near the protected area have input to management decisions? Process	Local communities have no input into decisions relating to the management of the protected area	0		
	Local communities have some input into discussions relating to management but no direct role in management	1		
	Local communities directly contribute to some relevant decisions relating to management but their involvement could be improved	2		
	Local communities directly participate in all relevant decisions relating to management, e.g. co-management	3		
Additional points Local communities/indigenous people				
24a. Impact on communities	There is open communication and trust between local and/or indigenous people, stakeholders and protected area managers	+1		
24b. Impact on communities	Programmes to enhance community welfare, while conserving protected area resources, are being implemented	+1		
24c. Impact on communities	Local and/or indigenous people actively support the protected area	+1		
25. Economic benefit  Is the protected area providing economic benefits to local communities, e.g. income, employment, payment for environmental services? Outcomes	The protected area does not deliver any economic benefits to local communities	0		
	Potential economic benefits are recognised and plans to realise these are being developed	1		
	There is some flow of economic benefits to local communities	2		
	There is a major flow of economic benefits to local communities from activities associated with the protected area	3		
26. Monitoring and evaluation  Are management activities monitored against performance? Planning/Process	There is no monitoring and evaluation in the protected area	0		
	There is some ad hoc monitoring and evaluation, but no overall strategy and/or no regular collection of results	1		
	There is an agreed and implemented monitoring and evaluation system but results do not feed back into management	2		
	A good monitoring and evaluation system exists, is well implemented and used in adaptive management	3		

Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
27. Visitor facilities  Are visitor facilities adequate? Outputs	There are no visitor facilities and services despite an identified need	0			
	Visitor facilities and services are inappropriate for current levels of visitation	1			
	Visitor facilities and services are adequate for current levels of visitation but could be improved	2			
	Visitor facilities and services are excellent for current levels of visitation	3			
28. Commercial tourism operators  Do commercial tour operators contribute to protected area management? Process	There is little or no contact between managers and tourism operators using the protected area	0			
	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	1			
	There is limited co-operation between managers and tourism operators to enhance visitor experiences and maintain protected area values	2			
	There is good co-operation between managers and tourism operators to enhance visitor experiences, and maintain protected area values	3			
29. Fees  If fees (i.e. entry fees or fines) are applied, do they help protected area management? Inputs/Process	Although fees are theoretically applied, they are not collected	0			
	Fees are collected, but make no contribution to the protected area or its environs	1			
	Fees are collected, and make some contribution to the protected area and its environs	2			
	Fees are collected and make a substantial contribution to the protected area and its environs	3			
30. Condition of values  What is the condition of the important values of the protected area as compared to when it was first designated? Outcomes	Many important biodiversity, ecological or cultural values are being severely degraded	0			
	Some biodiversity, ecological or cultural values are being severely degraded	1			
	Some biodiversity, ecological and cultural values are being partially degraded but the most important values have not been significantly impacted	2			
	Biodiversity, ecological and cultural values are predominantly intact	3			

## Criteria and Indicators for Sustainable Forest Management.

International Conference on the Contribution of Criteria and Indicators for Sustainable Forest Management: *The Way Forward* (CICI-2003) Guatemala City, Guatemala, 3-7 February 2003

Encourage C&I Champions within Countries.

### What Are C&I?

Political leadership, and most forest managers, have endorsed sustainable development (SD) as a national goal [UNCED Forest Principles, UNIPF/IFF, FAO member countries' forest ministers, the Ministerial Conferences on the Protection of Forests in Europe (MCPFE) and country participation in regional C&I processes]. It is recognized that there must be a marriage between economic, social and environment goals if forest management is to be successful. SFM is the forest management sector's response to SD. Swaziland has stated it nicely, "It is hoped that the guiding principles and instruments enshrined in the National Forest Policy will help in solving the socio-

economic and environmental problems listed above through the application and achievement of sustainable management and development of the national forest resources".<sup>55</sup>

C&I are a tool available to forest managers, policy-makers and the public to assess progress towards SFM. C&I are a powerful tool because they are the product of wide stakeholder participation, consensus and acceptance. C&I were designed to help decision-makers, stakeholders and land managers understand the goal of sustainability and see the results, on a national scale, of forest management activities at the local level. Properly utilized, C&I are a tool to assess the effectiveness of government and non-government programs. They constitute a way to monitor the success of national forest programmes or strategic plans. In other words, C&I amount to nothing more than basic management science. In addition, with acceptance and use, unforeseen applications of C&I have been thought of, developed and implemented, such as using C&I as guidelines for forest planning (i.e. Pan-European management guidelines). This paper partially describes a number of these C&I applications.

SFM is a part of SD. Neither one should be thought of as a state or condition. Furthermore, it is incorrect to maintain that sustainability has been defined or arrived at. The World Commission on Environment and Development (1987) stated in *Our Common Future* that SD is not a "fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investment, the orientation of technological development and institutional change are made consistent with future as well as present needs". In keeping with this notion, national C&I function to guide policy, investment programmes and local management activities by providing biological, social, economic or institutional conditions indicating a nation's progress towards SFM. Using C&I data, policy-makers have a means to navigate towards SFM. Such navigation must be a transparent and collaborative process in which stakeholders express their desires.

C&I are not a "model" for calculating a sustainability index. Progress towards SFM is the result of constant adjustments to policy, investments and management in response to indicator trends. There will be disagreements over the appropriate actions to take concerning whether sustainability has yet occurred. However, because the data are available to all stakeholders, the rationale for the decisions will become better reasoned. As C&I data are accepted, the focus of discussion can shift from the validity of the data to what must be done. Once periodically reported C&I data is accepted and can be appropriately used, the real questions for SFM can be addressed.<sup>56</sup>

### **Land and forest rehabilitation plan:**

Based on these priority issues, a framework of sustainable forest management options has been developed for the rehabilitation of land and forests in the study area. The criteria for developing sustainable management options will ensure that the alternative options for addressing the primary causes of forest degradation, such as stabilization of the wood demand of various stakeholders, are seriously considered. This could be done either by wood demand management through the introduction of wood-fuel saving devices and alternative substitutes for timber and wood-fuel or by wood supply management like increasing the supply of wood-fuel through the production of more tree plants in the forests/barren lands and farm lands. Fisher (1998) has reported that the introduction of improved

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55 Swaziland, 2001

56 <http://www.fao.org/3/J0077E/J0077E04.htm#TopOfPage>

cooking devices has not produced a significant impact in reducing wood demand in the study area where plenty of CPF resources are available free of cost. Therefore, the other wood demand management options like the introduction of alternate sources of timber and energy can be considered in terms of their feasibility as part of the framework for sustainable management options in the study area.

The wood supply management options aims at increasing the wood supply sources not only through increased plantations on public, community and private waste/farmlands. Rather, it may include also the protection of the existing plantation and regeneration through efficient management. These activities may also prove to be failures if these are implemented through the existing forest management system currently being adopted by the Forest Department. This may require an entirely new approach, which may also include community participation for sharing the financial and administrative responsibilities of the forest department relative to the production and protection of the tree plantations. To ensure community participation, it is essential to make large scale institutional arrangements that may allow community participation in the study area. For this purpose, the Forest Department shall make necessary changes in the existing regulations for the establishment of Village Development Committees (VDC) in the Guzara Forests and Joint Forest Management (JFM) in the Protected Forests. This may also require the establishment of an independent forestry extension unit at the local level for effective community coordination using community mobilization techniques. It is envisioned that the first step towards realizing these goals is to initiate the adoption of a community based forest management in the study area.

### **Community based forest management**

The existing forest management system does not allow community participation in the forestry programs. Thus, most of the past forestry development programs failed due to lack of community participation. In order to increase community participation in forest management, either the existing forest divisions shall incorporate community-based forestry elements into their program or new field positions shall be created for this purpose. After making necessary legal, administrative and capacity building arrangements in the forest department for community based forest management, VDCs shall be established as a target group for forestry extension in all the villages of the study area. Farm forestry extension and JFM at village level shall follow this provision. As a first step in community based forest management, a target group should be established as a basic unit for the effective coordination and transfer of technology. For this purpose, a village level committee (VDC) comprising of village leaders, progressive farmers and right holders shall be constituted in each village. The Forest Department shall ensure the development of good working relationships with each of these committees through regular contacts and coordination. For this purpose, the forest department may require the services of a sociologist and other extension professionals. These VDCs may be used for forestry promotion activities in both the CPF and the farmland.

Joint forest management offers community friendly relationships by involving the local community in the management of the CPF. This is an entirely new concept for forest management in the study area. The NWFP forest department has already started policy planning for the introduction of JFM in the high hill forests of Siran watershed. Under this system, the Protected/Reserve Forests would be declared as a village forest under sections 27 and 28 of the Forest Act-1927 and the Hazara Forest Act-1936. In this way, the forest department and local communities would jointly manage these forests

through a set of working regulations that are appropriately suited to the area's biophysical and socio-economic conditions. Experiences of JFM may also be replicated in AJK. The involvement of the local community could be ensured through direct incentives like provision for grazing, wood-fuel and timber collection for domestic purposes. Through these incentives, they would in turn help the forest department in forest protection and conservation.

#### **Integrated forest management**

Forestry is not going to work in isolation as was done in the past management plans. Forestry would require adopting sustainable management involving social, economic and environmental consideration much beyond enumerating just trees for felling or re-planting. There is a need to adopt ecosystem approach for managing all the components of forestry ecosystem under an integrated management plan. Valuation of goods and services of forest trees as per the detail given at Annex-II has to be undertaken so as to appreciate the true value of the forests trees and its role in balancing the ecosystem and the environment at large. The forestry resource in these fragile catchments will require to be managed by adopting policies and plans that favours promotion of Non Timber Forest Products (NTFP) as against the traditional logging for timber.

#### **Forest Department Community outreach.**

Forest Departments of NWFP and AJK are plagued with lack of community outreach support and services and except a few project oriented community based forestry interventions (like watershed management, social forestry in NWFP and Integrated Land Management and Mangla watershed management project in AJK), it failed to institutionalize the community outreach for involving communities in its regular functioning. These project driven community involvement are not sustainable as experiences shows that the day the project come to a close the community organizations also vanish. Therefore, with a view to institutionalize the community organizations in the organizational set up, the forest department has to accept the ground reality and enter into partnership with the communities on permanent basis. The AJK forest department has taken a lead in this regards and is working to devise strategies for long term community involvement by using the platform of the AJK Rural Support Programme for an effective community outreach. This will hopefully solve the community outreach problems in the future, however the NWFP forest department may also work on similar lines using the platform of the Sarhad Rural support Programme (SRSP) for community outreach. This will also require revision of forest laws in favour of empowering the communities as has been done in the Northern Areas Forestry and Wildlife Department that has resulted in protection of wildlife through community watchers.

#### **Repercussions on rural poor women.**

As forestry is the life support system for most of the rural poor including the women and therefore its degradation will directly affect the poor segment of the society. Women involvement in forestry includes gathering fuelwood, charcoal, grass cutting, fodder leaves, water, medicinal herbs, fruits, mushrooms, sericulture, apiculture, poultry and livestock grazing. Most of these livelihoods activities are badly damaged by the earthquake and therefore these sources of earning of the poor women in the four pilot areas are lost. CBLRP is working to revitalize these goods and services of forestry sector for the women through various interventions mostly focusing on capacity building.

However, for sustainability of these interventions there must be an institutional mechanism to own all such project related interventions as an exit strategy of CBLRP.<sup>57</sup>

**Conclusion:**

I close on the Note That Action needs to be take NOW! If not by the Government, then by the Citizens who will be the ultimate beneficiaries or Losers as the Case may be.

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57 Land and forest resource rehabilitation and development plan CBLRP (FAO).